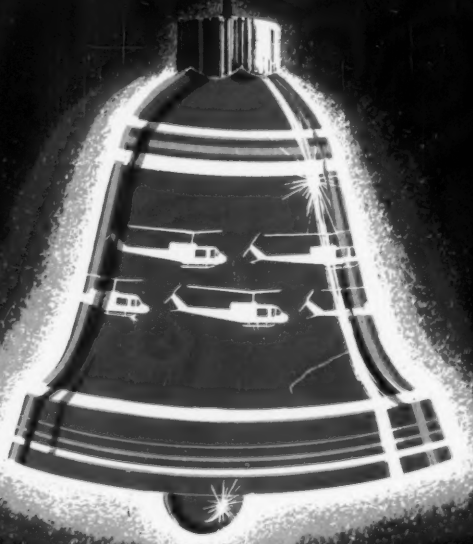
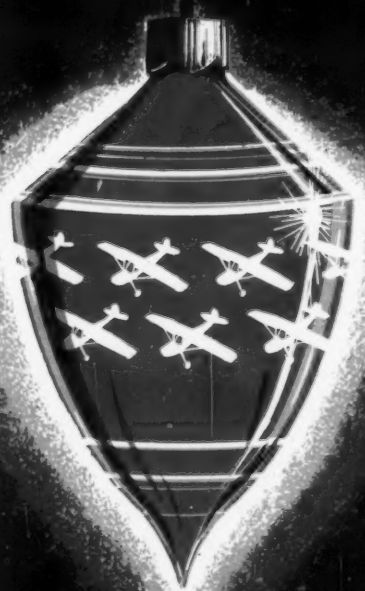
UNITED STATES ARMY

DECEMBER 1966

AVIATION DIGEST





UNITED STATES ARMY AVIATION DIGEST

DIRECTOR OF ARMY AVIATION, ACSFOR
DEPARTMENT OF THE ARMY

BG Robert R. Williams

COMMANDANT, U. S. ARMY AVIATION SCHOOL

MG John J. Tolson, III

ASST COMDT, U. S. ARMY AVIATION SCHOOL

COL George W. Putnam, Jr.

DIGEST EDITORIAL STAFF

CPT Frank A. Mariano, Editor-in-Chief
Richard K. Tierney, Editor
William H. Smith
Diana G. Williams

GRAPHIC ART SUPPORT

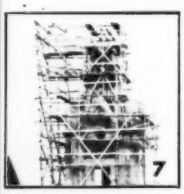
Harold G. Linn
Harry A. Pickel
Dorothy L. Crowley
Angela A. Akin

DIRECTOR, U. S. ARMY BOARD FOR AVIATION ACCIDENT RESEARCH

COL Warren R. Williams

USABAAR EDUCATION AND LITERATURE DIV

Pierce L. Wiggin
William E. Carter
Ted Kantos
Charles Mabius



DECEMBER 1966 VOLUME 12 NUMBER 12

Dear Santa Claus 1

That Out-of-Place, Followed-by-Movement Look, CPT Thomas O. Kuypers 2

A Shrine Rebuilt 7

Watch Out Or the 'Bugs' Will Get You 10

The Airmobile Clinic, CPT Carl F. Bartecchi 13

Development of a Widget, CPT Norman T. Elliott 16

'Diplomatic' Survey Mission MAJ Duane O. DeBoer 18

Training—The Key to Airmobile Operations, MAJ Howard M. Williams 20

51 Hours At 45 Below, CPT Roy McDonald 24

Flight Officer Retention, CPT William H. Zierdt, III 30

Crash Sense 32

OH-6A Flight Records 48

The mission of the U. S. ARMY AVIATION DIGEST is to provide information of an operational or functional nature concerning safety and aircraft accident prevention, training, maintenance, operations, research and development, aviation medicine, and other related data.

The DIGEST is an official Department of the Army periodical published monthly under the supervision of the Commandant, U. S. Army Aviation School. Views expressed herein are not necessarily those of Department of the Army or the U. S. Army Aviation School. Photos are U. S. Army unless otherwise specified. Material may be reprinted provided credit is given to the DIGEST and to the author, unless otherwise indicated.

Articles, photos, and items of interest on Army Aviation are invited. *Direct communication is authorized to: Editor-in-Chief, U.S. Army Aviation Digest, Fort Rucker, Alabama.*

Use of funds for printing this publication has been approved by Headquarters, Department of the Army, 29 December 1964.

Active Army units receive distribution under the pinpoint distribution system as outlined in AR 310-1, 20 March 62, and DA Circular 310-57, 14 March 63. Complete DA Form 12-4 and send directly to CO, AG Publications Center, 2800 Eastern Boulevard, Baltimore, Md. 21220. For any change in distribution requirements, merely initiate a revised DA Form 12-4.

National Guard and Army Reserve units submit requirements through their state adjutants general and U. S. Army Corps commanders respectively.

For those not eligible for official distribution or who desire personal copies of the DIGEST, paid subscriptions, $4.50 domestic and $5.50 overseas, are available from the Superintendent of Documents, U. S Government Printing Office, Washington, D. C., 20402.

Nha Trang, Vietnam

Dear Santa Claus,

I am writing to you with the hopes that my record during the past year has not been too blemished and that I will receive at least two or three nice presents this year.

The things you left me last year were not exactly what I had hoped for. I'm still trying to figure out why you left me an Air Force B-52 pilot. He was not only too large for the stocking, but we don't have any airplanes larger than a U-80 -- and that doesn't have a bomb rack or even a place to throw flour bags at troops in bivouac.

I'll admit that I wasn't everything that a person in aviation should be, but you have to admit that it takes a lot of fortitude to put up with all of the things that we encounter in our flight scheduling activities every day.

Your flight only goes out once each year and is on a pretty firm schedule. Try and figure out what would happen if the left leg of Blitzen or Nixen wouldn't check out when you were ready for takeoff with a load of gifts. And what kind of a pickle would you be in if you found that Rudolph's red nose had a short in it and wouldn't shine enough to show the other happy little reindeer the way.

You'd probably flip if you had scheduled your sleigh for a 0030 hour takeoff and then had someone tell you that your mission had been cancelled because a priority mission had come up and you would have to reschedule your gift run for some other night.

Whose head would roll if you stopped at someone's house and the reindeer suddenly took off just as you were squeezing yourself into a tight fitting chimney and when you called your boss about it he said, "Sorry about that, but we needed the sled for another mission and you'll just have to find your own way back"?

Enough excuses as to why I did the things that I did last year, but you have to admit that I had a few reasons for my strange actions.

I really don't want much this year, but a couple of little things would make my life so much easier to endure:

I would like a lighted scheduling board where I can write a mission and know that it won't be changed before I can even get to bed.

Please find me some mission sheets that will automatically cut off any priority flights after I have promised someone that we would be very happy to help them out of a difficult predicament.

Bring me some pilots who accept all missions, large or small, and cheerfully respond to all requirements without checking all of the other missions for a better one.

If you can't see fit to bring me any of the things that I have asked for, maybe you could bring me a case of "Old Grandad" to help me through the rest of the year.

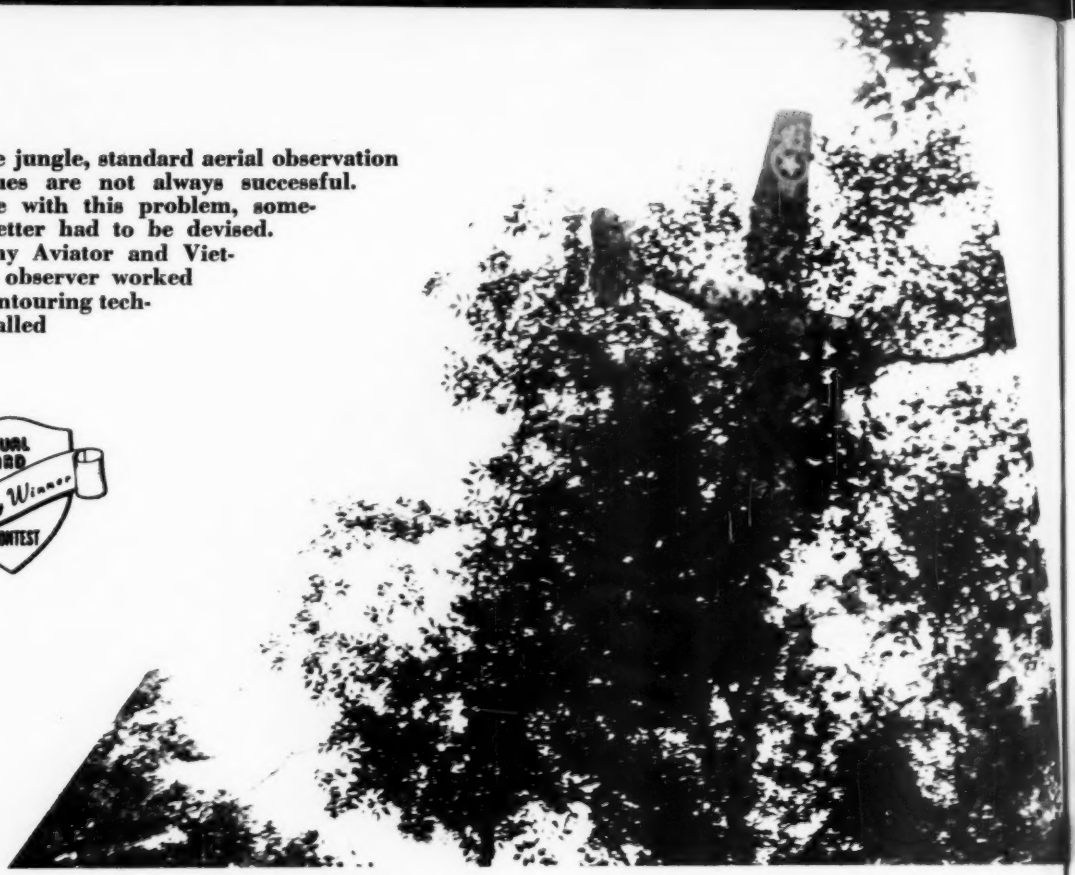
I'd better close now and get back to my 759s, -12s, and other forms that help to brighten up my day. Please give my letter some hard consideration this year.

Thank you for your help, and may you and the world find a way to peace and happiness amongst your bag of gifts this year.

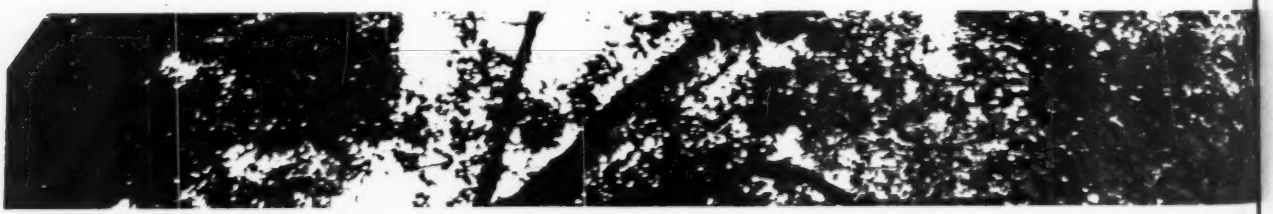
Cordially yours,

Richard L. Smith
Flight Operations Chief

In dense jungle, standard aerial observation techniques are not always successful. To cope with this problem, something better had to be devised. An Army Aviator and Vietnamese observer worked out a contouring technique called



That Out-of-Place Followed-by-Movement Look



Captain Thomas O. Kuypers

HAVING CONTACTED the Special Forces commander and picked up his Vietnamese artillery observer, LT Hubert E. Foster took off from a jungle strip located approximately 40 miles southwest of Hue, Republic of Vietnam, and began another day in search of the elusive Viet Cong. He was confident, and he had a competent observer who had flown as an observer in the French Union Forces a dozen years before.

The little O-1F Bird Dog climbed out over the thick jungle—mahogany trees, limestone cliffs, and ever-entangling vines—to a "safe" altitude considered to be out of danger of small arms fire.

"OK, Lieutenant Dat," said Lieutenant Foster in his pidgin

"Buildings! Buildings down there!" the little observer shouted

English, "we look. We look up and down the valley for VC. If we see, you call artillery. Artillery boom boom, you adjust; no more VC, number one."

"OK, Chung Ui, OK," replied the little Vietnamese Lieutenant.

So, for 3 hours they looked and saw trees, jungle, and limestone cliffs. Not a round was fired; not a single troop movement was sighted.

The same thing happened the next day, and the next, and the next. Nothing, absolutely nothing, was seen through that canopy —a frustrating experience for all observation plane aviators.

"I swear that what we need is an X-ray machine mounted underneath the fuselage. Then at the flick of a switch, the observer could see through that stuff. I'm sick of looking at trees, trees, trees!" exclaimed Foster. "There must be a way."

On Sunday morning an informal church service was conducted by the chaplain. Lieutenant Foster had stayed for services, having previously flown the chaplain into the camp from Hue. He and the chaplain were preparing to depart when the Special Forces commander asked him if he could fly a quick mission.

"What do you have in mind, sir?" asked Foster.

"Well, I'll tell you," explained the Special Forces captain. "It might not amount to anything, but just before you arrived we had a brief skirmish with a VC squad off the northwest end of the runway. One of the VC was wounded and we caught him.

"Doesn't seen possible," replied the aviator. "I've searched and searched that area the past few days, and all I've seen is jungle—lots of jungle. But give me an observer, and if the chaplain's in no great hurry to get back to Hue, we'll see if there is anything out there."

A few minutes later Lieutenant Dat appeared. He and Lieutenant Foster climbed into the little plane. After the usual runup procedures, they were winging their way over the jungle to the supposed location of the Viet Cong encampment.

Seeing nothing, as usual, at 1,500 feet, Lieutenant Foster said to his observer, "Dat, we go down on deck and see if we observe any better."

Foster dived the aircraft to his left, and in no time he was on the deck of the canopy. Zigzag across the treetops. Nothing. More zigzag. The tops of huge mahogany trees went skimming beneath the wings; a few birds in the upper branches scattered at the approach of the noisy Bird Dog.

Up ahead and at about two o'clock, a slight movement of the canopy caught Lieutenant Foster's eye. He turned the airplane toward the movement he had just seen.

"Dat, keep your eyes open. We may have something."

"OK, I look," replied Lieutenant Dat.

The Bird Dog continued contouring the treetops, and then . . .

"Chung Ui! Chung Ui Foster! Buildings! Buildings down there!" shouted the little observer, his voice pitched high with excitement.

"I didn't see a thing," replied the Army lieutenant. "We go across from new direction."

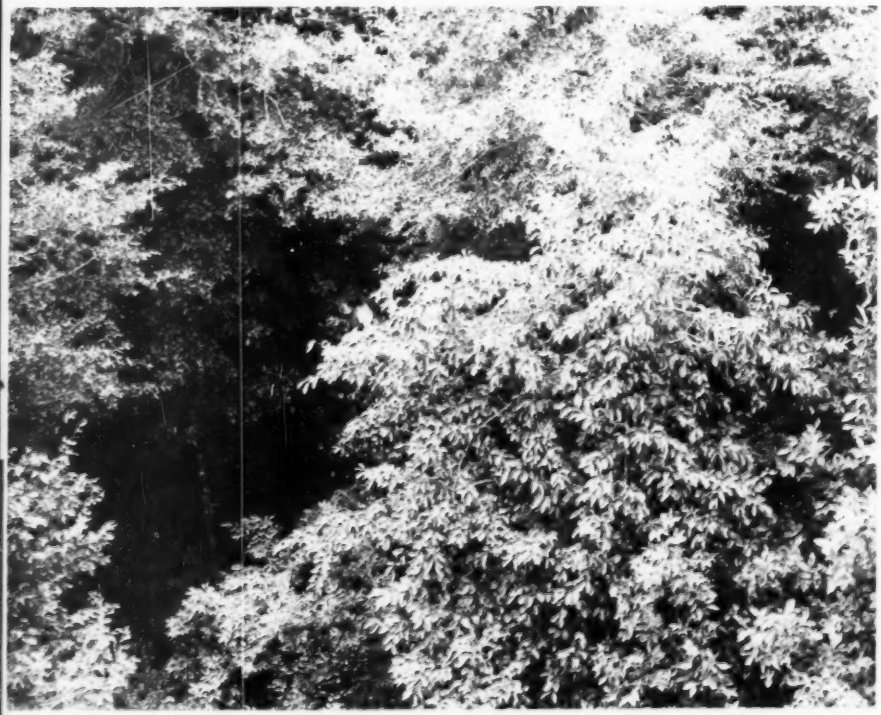
Again the airplane cruised over the treetops, and this time Lieutenant Foster saw it.

"Dat, village down there! No telling how long it's been there," stated Lieutenant Foster, "Let's make one more pass. I can't believe it."

Once more Lieutenant Foster maneuvered the light observation plane over the treetops across the area where the newly discovered

---

CPT Kuypers is assigned to the Academic Training Division, USAPHS, Ft Wolters, Texas.



Above: Taken from above range of effective small arms fire.
Below: Taken from treetop level. Notice how much better the observer can see through the jungle canopy while contouring.

strongpoint lay camouflaged by the jungle. This time the all too familiar "pop, crack, pop" of small arms fire was directed toward the gadfly as it buzzed above the trees.

"VC shoot, Chung Ui, VC shoot!" exclaimed Lieutenant Dat.

"Well, we know they aren't friendly at any rate," replied Lieutenant Foster. "Dat, start adjustment; start adjustment."

Now it could be assumed that Lieutenant Foster took his little plane back up to a safe altitude while LT Nguyen Pham Dat started artillery adjustment; that as the rounds began to fall, the adjustments were made; and that eventually the Vietnamese equivalent for "fire for effect" was given to the guns, which, of course, resulted in destruction of the Viet Cong strongpoint. And it could further be assumed that all of this normal adjustment was done way up there in the air where, just as the book says, the airplane served as an excellent observation means. All of this could have been assumed, and Lieutenants Foster and Dat would have returned to Hue, ending another successful episode of Army aviation's story in Vietnam.

But this simply was not the case. Remember, at this safe altitude the two officers could see nothing below the thick jungle foliage. It was only after noticing the *unusual movement of the trees while contouring* that they discovered the strongpoint. Lieutenant Foster chose to stay at treetop level, and started to bring in the rounds so he could adjust onto the target.

Lieutenant Dat relayed the coordinates to the battery, which was already laid in the general direction of the suspected encampment. Within 3 minutes the first round was on the way. Lieutenant Dat purposely requested the first round to be short, for

they were contouring just behind the target.

The first round exploded approximately 200 meters short of the target. Using the standard bracketing method of adjustment, "400" was added along with the slight deviation correction to the next request. Lieutenant Foster maneuvered the O-1 parallel to the gun-target line accordingly. The second round came in and exploded on the other side of the emplacement. Flying parallel to the gun-target line along the treetops, both observer and pilot could easily observe their efforts and agreed they had the VC pretty well bracketed. The final adjustment was relayed to the battery along with the order to fire for effect.

The rounds came crashing through the thick foliage, and the concussion lifted the O-1F about 30 feet farther into the air. Two secondary explosions were effected, and Lieutenants Foster and Dat could now observe huge pillars of black smoke rising above the jungle. After days of frustrating observation they had found a target . . . and a way to "see."

This method of treetop artillery adjustment proved to be successful. After this initial experience it was tried by other aviators in the platoon, and was found successful not only as a means of adjusting fire on a jungle target, but in finding the enemy in the first place.

Since aviators and observers were completely familiar with the terrain in that section of Vietnam, they had no problem locating themselves when contouring. This meant that if something were discovered while flying in search of enemy movements, only a quick map check was needed to pinpoint the location.

Standard observation techniques are not successful in dense jungle. To cope with the problem something better had to be devised. It was!

For lack of a typically Army pedantic word to describe this new observation technique, the observation aviators called it that "out-of-place, followed-by-movement look." Knowing their assigned areas intimately, their first hint that something might be happening was to observe a section that just didn't look quite right. Maybe just a big mahogany tree that has been there before wasn't there now; or the river water was clear 10 minutes ago, but now it was muddy . . . little things that were just simply "out of place." When this out-of-place item was observed, it was further investigated by contouring across the suspected area.

While contouring, the observers would be watching for the second clue in their observation technique: movement. Movement of a tree or vine entanglement, movement of rocks or dirt, or movement of an undisciplined soldier —*movement* was the key. No longer did the aviator look for objects such as gun emplacements, troops, vehicles, or foxholes; rather, he looked for movement, because movement could not be disguised.

When contouring the suspected zone, an airspeed of 110 to 120 mph was maintained. Since observation was being made for movement and not for things this speed was ideal for catching any unusual movements in the area of observation. The eye is quick to grasp movement, whereas a fixed camouflage position might never be seen.

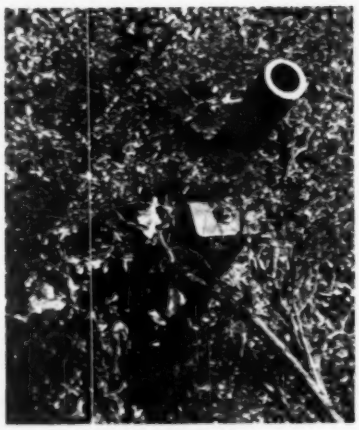
Oh yes, there were many false alarms. There were many cases where an aviator would view one of those out-of-place areas, and then find absolutely nothing when he contoured for movement. But during a 4-month period of 129 such out-of-place sightings in the I Corps area, 32 proved out.

The discovery of a company-sized force moving along a jungle trail toward an isolated Vietnamese outpost was one.

This discovery represents a classic example of the out-of-place, followed-by-movement method. A Vietnamese observer saw two trees that had only recently been chopped down, whereupon the Army Aviator took his O-1 down to the treetops. As they contoured the area, one undisciplined trooper broke and ran across a jungle trail. On the second pass over the area it looked as if the entire jungle on both sides of the trail had suddenly come to life and was on the move. The camouflage was magnificent, but the *movement* of one man coupled with the chopping of two trees had given away the location of the entire company. AD-6 Skyraiders were called in by the observer. Instead of a surprise attack launched by the enemy, the tables were turned.

The method proved its validity

With a way to "see," artillery destroyed the VC village



The new techniques increased the effectiveness of artillery

in jungle terrain. It was an Army Aviator and a Vietnamese observer after days of fruitless search who produced the results with a new technique. Produce it did. Not that our present system of teaching aerial observation methods is wrong, but it had netted us nothing over the thick, mountainous jungle in the northern section of the Republic.

Adjustment of artillery fire while contouring would appear, at first glance, hazardous. Many have expressed understandable disbelief that it was even attempted, let alone accomplished. But it is neither extremely hazardous nor unbelievable. It became almost routine and quite effective.

Not only can the aviator and observer see more "on the deck," but the chances of his being hit are less than generally believed.

The slight risk involved in contouring was more than amply justified by commanders and American advisors. Artillery utilization was increased, and it started showing results. In fact, it was so successful in the ARVN First Division area that the senior advisor assigned available O-1 aircraft to operational control of the division's American artillery advisor, and consequently to the batteries and guns of the First Division.

This method is not intended as a panacea, but it is certainly a method which has proved successful and workable. Naturally, as in any technique, certain prevailing conditions must exist including:

An intimate knowledge of the terrain in the area in which this technique is used. This would imply that a staggered system of rotating personnel be used.

A close working relationship between artillery batteries or using effort and the aviator-observer team.

The aircraft given completely to the operational control of the utilizing effort; i.e., the artillery batteries.

The out-of-place, followed-by-movement method has proved to be an extremely effective way to observe the enemy in the jungle. This technique, in summary, is:

- Know the area of surveillance completely.
- Watch for anything that may look out of place, suspicious, not quite right.
- Contour the suspected area.
- While contouring, observe any unusual movements.
- Act upon the confirmed find; if nothing is confirmed, return to altitude.

Imagination, initiative, and a little bit of luck combined to discover an effective method for dealing with jungle observation problems. Nothing tells more than results achieved. Mark another up for the durable, dependable O-1.

ANNOUNCING A LARGER DIGEST

A BRAND NEW YEAR and a larger DIGEST! Beginning next month the DIGEST will jump to 64 pages—an increase of 16—to enable more extensive coverage of information enhancing safety throughout the Army aviation program.

The additional space offers the opportunity to get much more significant information disseminated faster.

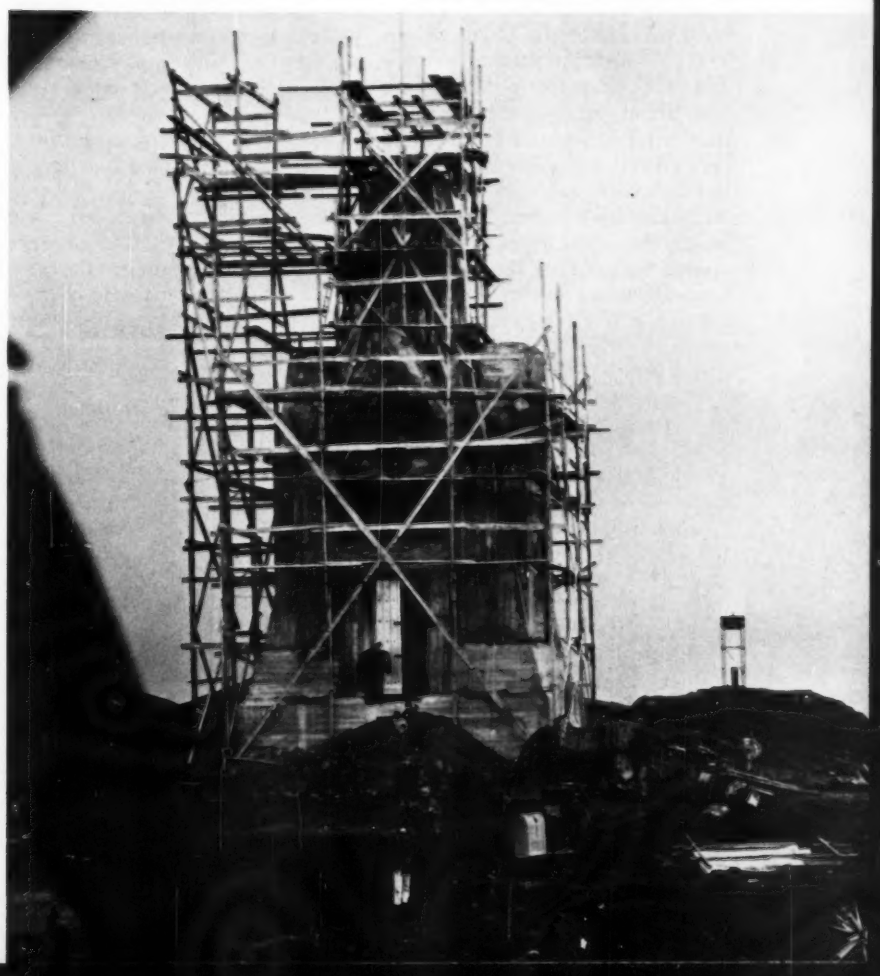
You or anyone in your unit may have information or an idea that someone else could use or expand. The DIGEST is your magazine and your means of obtaining and trading information *Army-wide*. Your contributions are needed. They don't have to be finished literary scrolls. They can be just written out as a rough article and submitted along with photographs or sketches (if appropriate) to the Editor-in-Chief, U. S. ARMY AVIATION DIGEST, USAAVNS, Fort Rucker, Ala., 36360. All material submitted from Vietnam should be first cleared by MACVOI.

A Shrine Rebuilt

LOVE, SELF-SACRIFICE, and backbreaking labor went into building the shrine. At the turn of the century a devoted people in the Lombardy region of Italy conceived and built the Monument to the Redeemer as their contribution to a national religious movement to dedicate the 20th Century to the Lord. For two years, men and mules toiled up the 6,000-foot slope of Mount Guglielmo, carrying on their backs the materials needed to erect the shrine. Then finally, on August 24, 1902, thousands of worshippers ascended the mountain to dedicate the imposing structure.

Now, 64 years later, a Southern European Task Force helicopter circled all that was left of the monument with a massive load of building materials slung under its belly, hovered momentarily, and released its burden to the workers below. Thus began a massive job of reconstruction. With the aid of Army Aviators from the SETAF command, the dreams of many residents of the area to rebuild this abandoned shrine began to come true.

Through the years the monu-



ment had served the Lombardians who climbed to the two-story structure to worship and those who found refuge there as Alpine storms raged around it. But the very elements thwarted by the religious haven gradually wore away its sandstone exterior. Icy winter blasts, snow, and water inexorably eroded its graceful lines until its proud 20-foot cross toppled to the ground and its roof crashed inward.

It stood that way for many years until one day in early 1964 some interested residents met at the town of Gardone Val Trompia in the shadow of Mt. Guglielmo and made plans to rebuild the shrine. As their forebears had done years before, the people offered their money, their abilities, and their muscles to help reconstruct the mountain shrine.

But one seemingly impossible obstacle remained: how to get the nearly 500 tons of lumber, steel, sand, and gravel needed to the top of Guglielmo? Materials for the original shrine had been transported by the many dray animals in the area. Now farm modernization had done away with these animals.

Had this tremendous problem brought a permanent halt to the inspired hopes of the people? Time passed as an answer was sought. Then late in 1965 a chance conversation brought out the question: Have you thought of helicopters? . . . But where would

Above: A SETAF helicopter swoops toward a landing site with supplies to be used in rebuilding the shrine. Below: Another CH-34 places a load near the 18-foot cross that will embellish the new shrine on Mount Guglielmo.

they come from? How expensive would their rental be?

The American command, the Southern European Task Force, had been known to use their aircraft for civic assistance, but usually only in emergency situations. Would the Americans commit themselves to a nonemergency situation, no matter how worthy?

Meanwhile the bishop of Brescia forwarded a letter of request to SETAF on behalf of the construction committee. At the command's headquarters predetermined criteria for handling such requests was weighed against the Guglielmo situation. This was not an emergency, so many questions must be answered.

Was the operation feasible? How could the project serve the advantage of the SETAF mission? What about cost? These and other points had to be considered.

Officers of the aviation company made an aerial and ground survey of the area to determine the feasibility of the helicopters transporting building materials to the mountaintop. Once feasibility was established, consideration turned to the SETAF mission. To fulfill its mission to support U. S. and Italian troops operating in remote mountain areas, SETAF aviators must have specialized training in mountain flying. Regulations require that pilots must have an initial 20 hours instruction in this kind of flying and must maintain their proficiency with a minimum of 5 hours of Alpine flight semiannually.

Normally this training is accomplished by routine flights to mountain sites and by lifting dummy loads to a mountain point. It happened that the aviation company was planning just such training operations in the near future. Mt. Guglielmo and the rugged terrain over which the helicopters must fly to reach its peak were ideal for this training.

To peace and friendship among nations

Statistics were gathered. Estimates were made of the number of flying hours required, the amount of fuel needed, the number of days to accomplish the gigantic lift. Finally, a comprehensive report was prepared and forwarded to higher headquarters recommending that the project be approved.

On 20 April 1966 two CH-34 helicopters departed from Verona Army Airfield and made their way to the field at Marcheno, near the selected base camp at Gardone Val Trompia. There huge piles of construction material were ready for the mile-high journey to Guglielmo.

But clouds obscured the top of the mountain and no flying could be done that day. Early the following morning, the pilots climbed into the cockpits, the helicopters rose vertically, pivoted and began the ascent to the ruins of the Monument to the Redeemer. Operation Guglielmo was underway.

Twelve pilots rotated the duties and shared training hours in lifting the lumber, steel supports, sand, gravel, and cement to the snow-capped peak. The loads averaged 1,500 pounds and more than 700 flights were made to transport almost 1,000,000 pounds of material from the pickup point near Gardone Val Trompia to the top of Mt. Guglielmo.

This massive project, in which the SETAF pilots combined training operations with a civic assistance gesture, made possible the rebuilding of the Monument to the Redeemer. In future years those who sought its protection on the mountaintop would not forget the airmen who helped make it possible. Permanently imbedded in the concrete facade of the monument is this message:

"All Brescian people on this inaugural day, gratefully remember the generous and essential contribution given by the U. S. Southern European Task Force to the rebuilding of this monument, which shall ever testify and betoken peace and friendship among nations."

School children watch a SETAF CH-34 leave for the shrine site

WATCH OUT!

Or the "Bugs" Will Get You

SHORTLY AFTER World War II the G-2 of an Army unit in Germany was visited by a representative of an electronics firm. The visitor puzzled the American officer. In Germany a briefcase is usually carried by German businessmen. It seems to be part of his uniform. But this man was completely empty handed; he didn't even have a pad for taking notes.

Also he didn't act like the crisp German businessman. Most of them are fearful of wasting your time. They state their business, make their point, and depart as quickly as possible. But this man made only small talk—the weather, a coming German holiday, and the relative merits of German and American beer.

Suddenly he stopped talking and pulled a fountain pen from his pocket. Handing it to the colonel he said, "This is our latest development, the finest fountain pen ever made. Try it and see if you don't agree."

The colonel took the pen and scribbled a few words on a pad. It worked smoothly enough but not any better nor worse than any other pen of the time.

Being a polite man, the colonel didn't tell the electronics man that he thought the pen no improvement. Instead he said, "Yes, it's good, all right, but isn't it strange for an electronics firm to develop a fountain pen?"

"Not this one. You see it's not only a fountain pen but also a miniature transmitter complete with microphone and power source. Every word we have said has been recorded. The receiver is in a car just outside. With your permission I will ask my confederate to bring it here so you can see for yourself."

When the man with the receiver arrived he had the whole conversation on wire. (A thin wire was used for making magnetic recordings before the present day magnetic tapes were developed.) The tone was remarkably clear and, like the electronics man said, every word had been recorded for posterity.

Sometimes the "mike" is in the most conspicuous place

This pen was not the first miniature transmitter ever made but it shows how far electronic eavesdropping had developed even at that time. Transistors were already working a revolution in small electronic devices. Today, with additional refinements, a transmitter the size of a fountain pen is considered large.

Now we have electronic eavesdropping devices so small that they fit under a rug without making a noticeable hump, so sensitive that one microphone will pick up all the conversation in several rooms, so efficient they filter out unwanted noise, and so powerful they transmit three blocks away.

The average American soldier doesn't give much thought to elec-

It's a new nail "mike." I'm taking dictation.

She has his word—on tape that is

There is hardly a conversation that cannot be picked up by an electronic eavesdropper

tronic listening devices. He has never lived in a police state where every word must be guarded. He assumes he knows little or nothing of value to an enemy agent, and he will tell you he has never been asked a military secret by an unauthorized person.

It goes without saying that there is not one single soldier in the American Army today who doesn't know something of value to a foreign agent. And enemy agents seldom ask questions. They don't have to. They can get most of the information they want by simply listening, either directly or at the receiving end of a "bug."

Army Aviators are considered special targets by enemy agents. They are key members of their unit. When plans are being made they are usually brought into the picture. Also because of the nature of their duties they travel around a lot. They spend many nights in hotel rooms and other places that can be easily bugged.

Most Army Aviators have no concept how far electronic listening devices have developed. Even as far back as World War II highly directional microphones that could pick up sound at a distance were in use. By aiming it, for instance, at a couple quietly talking some distance away, every word they were saying could be heard. These microphones are so commonplace today they are used by broadcasters to pick up the signals voiced by football players.

There is hardly a conversation that cannot be picked up by an electronic eavesdropper. There is a type of microphone that can be "stuck" to the back or side of a phone booth that will hear everything said. There's another that is so thin that it can be slid under doors or through windows.

One attaches to the head of a nail. The nail is first driven through a wall far enough to touch the back of the wall in the next room. When the microphone is attached to the nail the touched wall acts as a resonator.

Most TV stations today are equipped with cordless microphones. They are about the same size as regular microphones but are capable of transmitting short distances. These were not originally built to be "bugs" but they are sold on the open market and can do a pretty good bugging job.

"Bugs" come in many forms but can generally be classified as the type that uses wires to carry the electronic impulses to the receiver and those that transmit the impulses by radio waves. Both have advantages and disadvantages.

The disadvantage of those without transmitters is that they must have wires, which are a dead giveaway. However, they have a decided advantage. Microphones with transmitters admit a telltale signal which can be detected by a broadband radio capable of picking up signals of unusual frequencies. Wired microphones do not give off this signal.

To offset this disadvantage wires already in the room, such as those found on electrical outlets and intercom systems, are often used. A telephone tap now available not only uses the telephone wires but also uses the mouthpiece or receiver of the telephone to pick up conversations in the room where it sits. And the thing even works when the hand set is in the cradle and the telephone supposedly inoperative.

One of the most popular of the wireless type "bugs" is the kind placed behind pictures. The equipment is thin but not necessarily small. To install it, the paper backing of a wall picture is removed. The equipment is placed in the space usually found there and new paper backing installed. Unless the picture is removed from the wall and closely examined the "bug" cannot be seen.

To overcome the disadvantage of the signal produced by the transmitter type "bug," it is now possible for an agent to turn an electronic eavesdropper on and off by radio. It works like a remote controlled TV. If the agent feels that the bugged room is in danger of being searched electronically, he can deactivate his transmitter until the danger is over.

Agents who carry a "bug" on their person naturally use the transmitter type. They conceal them in briefcases, cigarette packs (along with a few real cigarettes in case someone asks for a smoke), ladies' handbags, pill boxes, and many other places. One has been designed as a cigarette lighter. It lights cigarettes as well as transmits conversations.

Sometimes the person carrying a "bug" has it planted on him and he doesn't know it. In one case a "bug" was dropped in the trousers cuff of a man on his way to a top secret conference.

The Army Aviator must remember that there are such things as "bugs" and that he is a prime target. He must also remember that bugging and antibugging is a profession and he is not trained to determine when a room or an individual is bugged. His best bet and only defense is not to discuss classified information in other than cleared areas. And of course never with anyone not authorized to receive such information.

The Airmobile Clinic

Captain Carl E. Bartecchi

AS A SOLDIER here in Vietnam, I marvel at the tremendous military achievements of that wonderful machine we call the helicopter. As a physician, I am still further impressed with the role it has played in the preservation of human lives. As a flight surgeon, I became aware of still another field where the helicopter is sure to excel—the air-transportable clinic. I would like to tell of my experiences with the founding, organization, and utilization of such a clinic.

CPT Bartecchi is assigned to the 41st Medical Detachment, APO San Francisco 96296.

The Airmobile Clinic

Since many areas in Vietnam are isolated from medical care (above) it was necessary to bring the assistance to the needy. The solution was the UH-1B (below).

Soc Trang Airfield is located in the Mekong Delta region of South Vietnam. It is just outside the town of Soc Trang, which has about 40,000 people. I am a flight surgeon working with the elements located at the Soc Trang Airfield.

In spite of its population, Soc Trang has only a few civilian doctors. Lack of trained medical help is typical of towns of this size, and it is even worse in the outlying villages and hamlets. In line with the civic action policies of the Soc Trang Military Compound and its commander, our medical unit set out to help organize a medical program for the town, especially for its large indigent population.

Needed was a system that provided quality medical care, efficiently, to a large volume of patients. It soon became evident that the best way to accomplish this was to set up an outpatient clinic much the same as is found in the States. With the cooperation of civilian officials, who more than welcomed the project, we proceeded to establish such a clinic. The "Soc Trang Clinic" proved to be a tremendous success. On an average clinic day, more than 200 patients would be seen, examined, treated, provided with medicines free of charge, and given future appointments at the clinic if their conditions necessitated it.

After several successful months with the clinic, months that provided our team with invaluable experience, we began to think of other ways that our acquired skills might be used. Daily we received reports from visiting sector advisors, telling of the need for medical care in the more remote areas of the country. Because of their location in the Viet Cong controlled portion of the country, these areas were isolated

from the medical benefits received by civilians in the liberated areas.

The high probability of a Viet Cong ambush made land or canal transportation to these areas too dangerous. To provide medical aid for people in these areas, we needed a rapid means of transportation which would allow us to spend adequate time at our destination. We needed a method of transportation that could carry a large number of people (an entire clinic staff of about 12 people), and large quantities of medicines and supplies. We needed transportation which would be relatively safe from enemy attack. As the needs were obvious, so was the solution—the helicopter.

We obtained a "Dustoff" UH-1B model helicopter for the mission, and set a date early in June 1966 as target for our first venture in this field. We carefully selected the site where we would set up the clinic. It was an area southeast of Soc Trang, centrally located between three large hamlets. A one room schoolhouse there appeared to be adequate enough to house the clinic. We had received reports that 30 children in that area had died of unknown diseases during the previous month.

In this as in future efforts there was a definite need to adequately secure the area before our arrival. This was usually easy to arrange because of the local Vietnamese Army officials who were enthusiastic about this project and very cooperative. They desired very much to have their areas visited by the clinic. Security in all cases proved to be more than adequate.

Our first such clinic turned out to be much more successful than we had anticipated. We were helilifted into the area, where we were greeted by several hundred people. The helicopter made four trips in all, moving the entire clinic and staff into the area in about 30 minutes. In another 30 minutes the clinic was all set up, and we began seeing our first patients. We had with us a new addition to our clinic. The airfield dentist volunteered his services to the clinic and proved to be a valuable addition.

Success of the clinic is evident from the statistics. About 400 people were interviewed, examined, treated, and provided with the medicines needed to overcome their diseases. Another 25 patients were seen by the dentist, who pulled almost 40 teeth before the end of the day. An important factor was that we had sufficient time to see everyone who came to us for help before the helicopter came to carry us back to our home base that evening. Reports that reached us in the days that followed confirmed our initial feelings about the success of the clinic.

Having gained much in the way of experience, and inspired by the success of our initial venture, we undertook a similar operation early in July 1966. Our destination was the village of Hoa Tu deep in Viet Cong territory. Its distance from Soc Trang made it more practical to make a single trip. This we were able to do with the help of two additional helicopters (UH-1Ds) provided by the commander of the 13th Aviation Battalion, who generously offered the assistance of his organization in this as well as future missions. Security was a bit more of a problem on this mission, but it was nicely handled, and fortunately so. After our arrival there, we learned that a Viet Cong unit had occupied the village on the night before we arrived.

The success of this second endeavor is again best told by the statistics. We were able to see, examine, treat, and provide with medicines over 450 people. The dentist once again saw about 40 patients, removing close to 60 teeth.

With two successful programs behind us, and with the tremendous need for future programs of this type, we are already planning for more and more frequent clinics in the remote areas of South Vietnam. The helicopter has scored another victory. The cause of freedom has a new modification of a not so old, reliable weapon.

Over 450 people were examined and treated, thanks to the airmobile clinic

U. S. Army hardware and concepts evolve through an orderly process. This article traces this process by following the

Development Of A Widget

Captain Norman T. Elliott

AN UNSOLICITED proposal from industry or a suggestion from an individual in the field might start the machinery moving toward the evolution and eventual adoption of a new piece of equipment, or widget, if you will for the U. S. Army. Normally, however, the gestation period for a widget starts with a United States Army Combat Developments Command (USACDC) Army Concept Program.

To accomplish its purpose of determining how the Army should fight, and what its equipment and organization should be, the United States Army Combat Developments Command (USACDC) employs a unified concept of operations which provides guidance for both the planning and the accomplishment of all combat development actions. The key to this USACDC program is the Army Concept Program.

Army Concept Programs address a specific 5-year period and are designated by the word "Army" followed by the last two digits of the fiscal year in which implementation of the program will be completed. As an example, the current Army Concept Program is Army 70 which covers the period 1 July 1965 through 30 June 1970. These programs are projected over a 25 year period and are, therefore, in consonance with the period covered by Department of the Army planning and the Army family of plans. The four future concept plans currently under development range from Army 75 through Army 90 inclusive.

Before reaching maturity, each Army Concept Program must pass through the five phases of combat developments: concept, doctrine, materiel, organization, and evaluation. The parameters of each phase are not absolute as each must be considered during the development of the others and, therefore, to determine exactly where a new materiel requirement first appears is rather difficult.

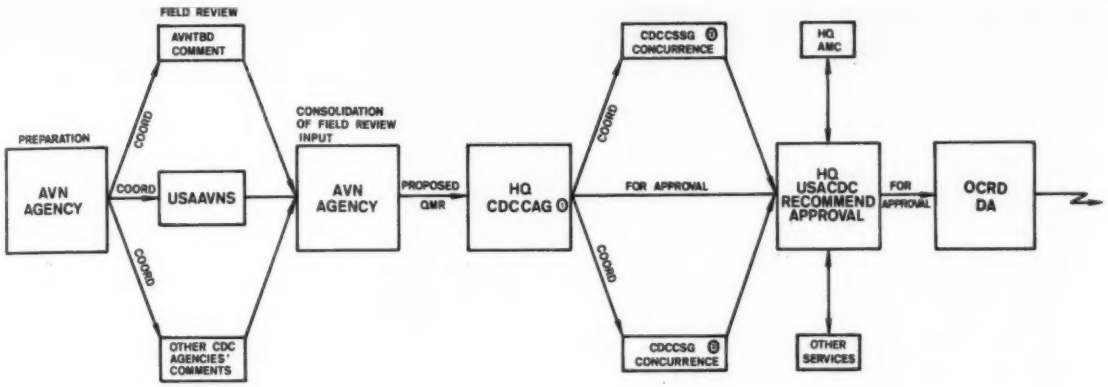
During phase I, or the concept phase, the broad guidance and general objectives which determine the direction of combat developments for the future are developed. The concept studies of the phase establish operational, materiel, and organizational objectives for phase II or the doctrine phase.

The doctrine phase develops the details for the implementation of approved concepts and is oriented toward the development of field manuals for the combat, combat support, and combat service support elements of the Army. In this phase the broad materiel objectives are identified.

Widgets arise! Phases I and II can be likened to courtship and marriage; widgets were considered but it is during the third phase or materiel phase that the widget is conceived. Army materiel requirements encompass the entire spectrum of science and technology, from basic research through type classification. It is here, in the third phase, that the statements of materiel requirements or objectives necessary to support the operational concepts and doctrine are formalized. These statements normally appear as qualitative materiel development objectives (QMDO), qualitative materiel requirements (QMR), or small development requirements (SDR).

At the risk of sounding like a dictionary, these requirements are all Department of the Army approved statements of military need for new (or improved) items, systems or assemblages. A QMDO is a very broad statement

CPT Elliott is assigned to the 9th Infantry Division, Ft Riley, Kansas.



① USACDC COMBAT ARMS GROUP
② USACDC COMBAT SERVICES SUPPORT GROUP
③ USACDC COMBAT SUPPORT GROUP

of need for a widget whose development is not within present technology. The QMDO makes money available for the conduct of research.

Widgets covered by QMRs are within technical development and are usually major items, systems or improvements and normally require from 2 to 8 years to develop. SDRs, on the other hand, define simple, inexpensive items which can be developed within 2 years and will cost less than $2½ million for research, development, testing and evaluation, and will not exceed $10 million for procurement.

The detailed organizational structures and documents to support specific DA approved operational doctrine are developed in phase IV. In the evaluation phase, or phase V, the validity of the other phases is determined. These evaluations are conducted concurrently with all other phases and use all methods available; i.e., operations research, wargaming, field experiments, troop tests, and, at times, actual battlefield testing.

To sum the Army Concept Program up in a neat little package, it includes all the studies, field manuals, QMDOs, QMRs, SDRs, tables of organization and equipment (TOE), troop tests, field experiments, and other actions required to provide the basis for intergrating the new or improved doctrine, materiel, and organization into the Army in the field during the designated period.

Efforts of the USACDC and its subordinate agencies are guided and coordinated by the Department of the Army Combat Developments Objective Guide (CDOG). CDOG is divided into 18 chapters, ranging from "Large Unit Operations" to "U. S. Army Requirements for Support from Other Military Services." It provides the necessary bond between the various agencies, eliminates duplication of effort, and serves as an inspiration for further creative thinking.

Now, how do we get a widget? Here I must borrow the old Chinese proverb of one picture being worth a thousand words and follow a widget from conception to birth.

Normally, a brief statement in the CDOG will set forth the requirement. From this a study is prepared by the responsible agency. After approval, the responsible agency develops the appropriate SDR, QMR, or QMDO to satisfy the needs of the study.

To illustrate I will follow a QMR through the gestation period. The Figure shows you the route of a QMR prepared by the USACDC Aviation Agency at Fort Rucker until it is approved by the Department of the Army.

After DA approval, the QMR is forwarded to the Military Requirements Review Committee (MRRC) composed of Deputy Chief of Staff for Military Operations (DCSOPS), Deputy Chief of Staff for Logistics (DCSLOG), and Chief of Research and Development (CRD) where a feasibility study is conducted, if required, and the widget is approved for programming.

After MRRC approval for programming, the widget enters an extensive period of concept formulation, cost effectiveness analysis, engineering development, test, and evaluation. Upon successful completion of testing and evaluation, the widget is recommended for type classification by the Department of the Army which must program funds for procurement.

All that remains now is for the widget to be manufactured in quantity and the supply and maintenance command issue it to the troops.

Not all the problems Army Aviators must cope with deal strictly with flying. In and out of the cockpit the Army Aviator is required to be many things, including a diplomat.

"Diplomatic" Survey Mission

Major Duane D. DeBoer

TO COMPLETE a certain map sheet in Panama, at least two more points had to be accurately located by the survey crew. These were in the vicinity of an isolated Indian village in the Darien Province.

Two helicopters with crews and equipment went from the base camp to the Indian village to make first contact with these people. The helicopters circled the village, and the pilot determined the best place to land was on a sandbar in the river that ran through the middle of the village. As the helicopters landed, the crews noted a rapid gathering of the villagers on both sides of the river. The group consisted of men only, each with a machete in his hand but without the smiling face they desired to see. So, the pilots kept the helicopters running while the rest of the crew located the chief and asked if they could talk with him. The chief seemed friendly so the helicopters were shut down and the meeting began in a large grass hut.

After the chief was made aware of the desires of the survey party, he talked it over with the other men of the village. By this time the children had overcome their fear of the helicopters, and a complete set of fingerprints of every child in the village had been accumulated on the helicopter bubbles. Finally, the chief said it would be possible for the survey crew to gather their data if they met the requirements demanded by the villagers.

MAJ DeBoer was assigned to the Tactical Instrument Division, Department of Rotary Wing Training, USAAVNS, Ft Rucker, Ala., when he wrote this article.

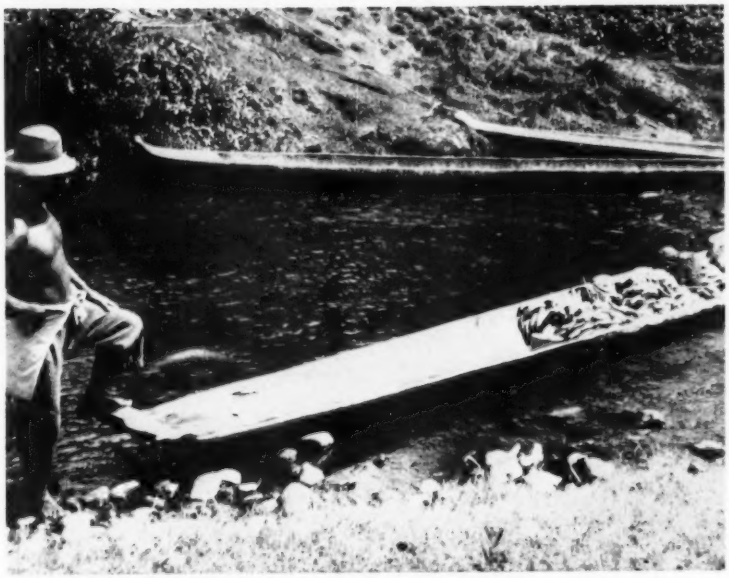
The chief would designate all the workers required by the survey crew and they would be paid $2.00 a day. In addition to this, a list was prepared of general items for the village. It went something like this: five gallons of kerosene, several hats and neckties, .22 ammunition, $100, cloth, food supplies, and a landing fee everytime the helicopters landed there.

Two members of the survey crew would be allowed to stay in the village to organize the work party and supervise preparation of the selected sites. The chief selected one man to guard the survey crew's hut which contained their supplies and equipment. He would be paid $1.00 a day.

Using Class B funds set up for this purpose, the supplies were procured from the Canal Zone and shipped to the base camp on the next supply run. Payment was made a little at a time, since the demands would increase if payment in full was made at the beginning.

On one trip to the village while I was waiting for some passengers to complete their business, I decided the children might appreciate a piece of candy. I had a one-pound can and offered a piece to the nearest child. He didn't seem to know what it was or what I wanted and was a little reluctant to accept a piece. After discovering it was something good, I was suddenly mobbed by about 50 frantically scrambling children. It must have looked like "Custer's Last Stand." I promptly released my grip on the can, retreated to the safety of the helicopter, and allowed them to distribute the loot by their own methods.

The work progressed well and in a few days the required data had been secured. Equipment and personnel were moved back to base camp as soon as their work was completed. Final payments were then made and the last two men prepared to leave the hut they had occupied for the last few days. When the old man who had faithfully guarded the hut was paid, he seemed reluctant to accept the money, so they reached over and put it in his hand. The old man said goodbye and slowly strolled out of the hut—and walked right straight into a tree. After he ricocheted off the tree, he called to one of the children to come help lead him along the path. This was the first time the men had realized their faithful guard was blind!



Above: One of the natives hired to assist the survey crew
Below: The hut and "guard" assigned to the survey crew

Training--

The key to airmobile operations

Major Howard M. Williams

ARMY AVIATION is proving daily in the Republic of Vietnam that airmobile operations can be conducted effectively in a limited nonnuclear war. The records that are being compiled prove that the early advocates of the airmobile concept were right, at least in one respect.

To best meet the increasing demands to provide more aviators for Vietnam, the Army Aviation School has taken giant steps to orient its training to meet the specific needs of Vietnam. This reorientation is good in that it is meeting the immediate requirements of commanders in that country who are in need of Vietnam-oriented aviators.

However, military planners must not lose sight completely of training requirements to cope with and survive on the nuclear battlefield.

The nuclear age—what effect does it have on military tactical doctrine? What actions are being taken to bring about balance to the imbalance created between weapons and mobility?

Airmobile operations are being openly discussed as a tactical operation worthy of consideration for any type war. The doctrine is being taught at all service schools, and training is being conducted in units both in the United States and overseas. It is hoped that the airmobile concept will meet the requirements of the nuclear age.

Airmobile operation is defined as an operation in which combat forces and their equipment move about the battlefield in aerial vehicles, under the control of a ground force commander, to engage in ground combat. The force that conducts the operation is composed of ground combat elements combined with Army aviation elements.

Airmobile forces, or teams, employed in offensive operations can transform limited success into sizable gains, or it can substantially shorten the time required to execute an operation. The

MAJ Williams was assigned to the Operations Division, Director of Instruction, USAAVNS, Ft Rucker, Ala., when he wrote this article. He is now serving in Vietnam.

above doctrine indicates that the potentials of the airmobile team are numerous. Threat of nuclear destruction defies military commanders not to exploit these potentials to their fullest extent.

Introduction of the atomic bomb to the weapons of war will create many new problems on the future battlefield. In addition to the devastation it can create, it will cause the future battlefield to become a mass of obstacles which will restrict, if not stop, most ground operations.

The nuclear threat demands that units disperse to provide necessary passive protection. This increased dispersion, in addition to reducing mutual support, decreases the ground commander's ability to mass forces at the decisive point when needed. The question posed here is: How will military forces perform offensive operations if they can't move?

It is obvious that new means of battlefield mobility must be provided to supplement ground mobility. This mobility is needed to increase the ground commander's flexibility in executing missions. I think the airmobile team, properly trained, is the answer.

Paramount in the development of any team is the training it receives. The airmobile team is no exception to this rule.

In selecting an example on which to pattern airmobile training, we could consider the combined arms team of Infantry and Armor. Specifically, we might use the tank-infantry team. Working together as a coordinated and well-trained team, the two have won many battles which could easily have been defeats.

Before discussing the responsibilities of various commanders, I hope these two comments will clarify the role of aviation in the combined team. First, it must be understood by all commanders that the sole mission of Army aviation is to enhance the capability of the Army to perform its overall mission. Second, aviation must be accepted as a member, a vital part, of the combined team. Those aviators at the controls of your helicopter have the responsibility to support your mission. They are dedicated soldiers who will do their jobs to the best of their abilities.

Commanders must accept aviation as a member of the combined team

Since training seems to be the key to the combined team's success, responsibility for training the airmobile team must then be established at all levels. It must be directed and properly supervised to ensure that the team will respond, at H-hour on D-day, to the call of the using commander.

MAJOR COMMANDERS

Commanders are responsible for everything their units do or fail to do. In line with this thought, we find that commanders at army and corps level are responsible for directing and supervising the training of transport aviation units. The major portion of training for the transportation units should be conducted with the combat units of the divisions to best develop the airmobile team.

Commanders must direct and supervise the training of their staffs to plan airmobile type operations. Simplicity in planning is essential to ensure the plans can be executed in a minimum of time and confusion.

Technical service units, combat support, and nondivisional combat units have responsibility to conduct training for airmobile type operations.

Since the airmobile concept is new, many commanders at lower levels perhaps will be reluctant to enthusiastically conduct the training. However, if we are to derive the desired result from our airmobile team, training must be conducted and in the same spirit as other combat training. Major commanders, therefore, must direct and ensure that the training is carried out.

GROUND COMMANDERS

Ground commanders at all levels should welcome every opportunity to incorporate com-

Well-trained, tank-infantry teams have won many battles

bined training with organic or supporting aviation units. This combined effort will benefit both units and ensure effective teamwork when employed as a fighting team.

They must remember that the mission of Army aviation is to enhance the operation of the ground unit. Aviation cannot perform this mission effectively unless it is included in all phases of ground unit training. Make use of the aviator's knowledge in planning your operations. He knows the capabilities of the equipment and can advise you in selecting flight routes and landing zones.

After you become airborne, you are totally reliant on the flight leaders to put you in the best position to accomplish your mission. To assist you in regaining control in the landing zone, the flight leader can give you the landing direction and information about the landing zone. Aviators perform their mission best when aware of what you are trying to accomplish.

Commanders must ensure that their troops are familiar with the types of aircraft that will support their units. The troops should be indoctrinated in safety procedures for loading, in flight, and unloading. To get the job done, they should be proficient in the techniques of rapid loading and reorganization in the landing zone.

Personnel responsible for equipment must be capable of preparing the equipment for movement and should be familiar with the techniques of loading it. Crews of the 106 recoilless rifle and the assault weapon vehicles must assist the helicopter crew in hooking up the equipment. Additional training in the techniques and procedures is required if expeditious movement is to be obtained.

Special individuals should be trained in selecting landing sites and in the techniques of guiding incoming aircraft to landing spots. This assistance is most needed when units are to be picked up from new areas, especially during periods of reduced visibility and when operating at night.

Speed is stressed during training with a mock UH-1D

On the future battlefield, night operations will become the rule rather than the exception. Units must stress night techniques in training and become proficient in these operations. Effective day training with the aviation units will greatly assist in conducting night training.

AVIATION COMMANDERS

Aviation units are responsible for placing the combat units on or near the objective as directed. This is an important mission—one they can and will effectively perform.

The aviation commander is responsible for the individual proficiency training of aviators within their unit and that their unit is trained to function as a team. After the unit is proficient as a team, it is trained with combat elements of the supported ground units to form the combined team.

In training their units, aviation commanders must ensure that the individual aviator becomes proficient in the techniques required to perform effective airmobile operations. Maximum use must be made of cover and concealment to provide passive protection from direct fire and air defense weapons. Cover and concealment may be provid-

ed by hill masses, valleys, treelines, river beds, and sometimes smoke. Altitude must be governed by the tactical situation which, in most cases, will require flights at altitudes of 15 to 100 feet above the terrain. Navigation at this altitude is very difficult; therefore, much training must be devoted to it.

During airmobile operations, emphasis is placed on maximum surprise and unit integrity. To achieve them, the combat force must be placed on the objective in the shortest period of time and in the desired tactical formation. This can only be achieved through teamwork, which is the end result of combined unit training.

To perform his mission properly under the many varying circumstances possible on a nuclear battlefield, the aviator's proficiency must be such that flying the aircraft will become second nature. It all boils down to this: our aviators must be at their best at all times.

Not only must the commander concern himself with the individual proficiency of his aviators, but he must also train his personnel in air traffic control, camouflage and security to round out the overall training of his unit.

Nuclear weapons, for a while, created an imbalance between firepower and mobility. This imbalance made it necessary to immediately change or adapt new means of mobility to bring the forces back into balance. The airmobile team, using the helicopter as a means of transportation, has been selected to help bring into balance firepower and mobility. However, to be successful, components of the airmobile team, infantry and aviation must be trained together.

Personnel must know how to set up landing zones

Commanders' interest and enthusiasm, will to a great extent, determine the effectiveness of the airmobile team. This effectiveness might well mean the success or failure of missions in any future war.

It will be hard to win a battle with an ineffective team. Therefore, the key to any successful airmobile operation will be the training the airmobile team has received.

The United States concept of war is that units will use bold, aggressive offensive actions to win battles. When we think of our present mobility and how it will be affected on a nuclear battlefield we say, "There must be another way." The other way was very effectively implied by MG Hamilton H. Howze when he said, ". . . it's hard to be audacious sitting at the botton of a hole. In the air just above the treetops lies one of the greatest hopes for victory on the ground."

The success of the airmobile team in combat depends on the success of its training program

I went down the slope and found a protected area

51 H
A
45 B

**Captain Roy McDon
Wing, Selfridge, was
ejection following a
wilds of Alaska. Here
printed from INTERCE**

AFTER THE chute opened, I looked up to check the canopy and found there was one rip in it, but it wasn't too large. This was the first time I noticed that my helmet was gone. The chin strap was fastened at time of bailout but I still lost it. After checking the canopy I attempted to cut the risers that are marked and managed to cut the right two without too much trouble, but couldn't reach up to cut the left two due to a shoulder injury. This was the first time I had noticed any injury.

The next thing I did was to deploy the survival kit. I checked my drift over the ground and noticed that I was moving quite rapidly. The ground was approaching pretty fast so I undid the quick release covers on the parachute and put my fingers in the quick releases, and prepared for landing. The moment my feet touched the snow, I pulled the quick releases and the chute separated completely. The wind was blowing pretty hard but there wasn't any danger of being dragged by the chute.

After getting my bearings I started looking for an area where I would be protected from the wind. About 75 to 100 yards down from the top of the ridge near where I had landed, there were quite a few trees, both green and dead, so leaving the parachute where it was, I took the life raft and survival kit and started down the slope. At times I could walk on top of the snow, but most of the time I would sink down to my knees, and the depth of the snow increased the further down the slope I went. When I reached the area of the trees, I noticed a spot that had been protected somewhat from the blowing snow and where there was already a pretty good depression formed in the snow.

Then I thought I should get my parachute out for a signal, but before starting back up the slope, I took two of the day/night flares out of the survival kit and put them in my pocket. I climbed back up on the ridge, cut out four panels of my parachute and tied them down to some small bushes. The remainder of the parachute was to be used for my shelter and any other items I might need.

Hours At Below

y McDonald, 1st Fighter dge, was faced with an owing a mid-air over the ska. Here is his story re- INTERCEPTOR.

I wondered about the value of the signal fires

Back down in the area where I had decided to make my camp, I tramped the snow down as deep as possible. I made an A Frame type of tent by stringing parachute cord between two trees and putting the parachute over it and tying it down to small bushes. To make the shelter a little more livable, I took one of the saws out of the survival kit and cut down in the packed snow to make the interior a little more roomy and the floor as level as possible.

I had decided to use the life raft for a mattress and inflated both LPUs, put them inside the life raft, snapped the cover and turned it over. Next, I took all of the padding I could find, such as the back pad off the parachute, and put it on top of the raft for insulation against the rubber. I put the sleeping bag on top of the raft, and this was to be my bed for at least that night. The remaining time before dark was spent mainly in getting wood, sorting out my equipment and trying to find a place to build a fire that wouldn't sink completely out of sight in the snow. It had always been my experience when trying to build a fire in deep snow, to use green logs as a base for the fire. However, I just didn't feel like taking the time to cut down some green trees that night, so I used the top part of my survival kit for a base, and built my fire in it. The kit is made of fiberglass and I knew it would eventually burn up, but I thought it would do for the first night and it did last for quite awhile before it caught on fire. I separated the equipment in the kit into several groups, putting all the signaling devices into one group (radios, strobe lights, flares, etc.), food in another group, and clothing in yet another group. Miscellaneous items (malaria pills, burn ointment, etc.) went back into the kit. I wanted each item where I could find it as quickly as possible when I needed it. While going through the food items, I noticed that two of the bouillon cubes and two chocolate bars that were supposed to be in the kit were not there and I wondered who had left them out. For my first meal in the Alaskan wilderness I had hot bouillon and it really helped me get going again. I guess

They were just too low to see me

I must have had a little letdown after hearing planes in the area that first afternoon, but none coming close on hearing my emergency radio signals.

During the night I found the walk-around sleeping bag adequate. I did get cold but it wasn't anything I couldn't cope with. Whenever I woke up cold, I would get up and walk around for a little while to get warm or start a fire and make some hot tea and go back to bed. One of the most important things was wondering about my family. What they were thinking and how were they taking it?

I was up early the next morning. I knew I had a lot to do and I could hear search aircraft in the area already. The first thing I did was to make two signal fires. One was located about 20 yards up the slope from my camp in a clear area. Actually, from my camp area to the top ridge it was completely clear with nothing but snow. I used pieces of dry wood for the base and built a teepee type fire on top, starting with small twigs and building up to large pieces of dry wood. I cut as many evergreen boughs as I could and put them on top of the dry wood. I placed one of the fire starters that are in the survival kit at the base of the firewood so I could get the fire going in a minimum of time. I used my campfire for the other signal fire and had a large pile of evergreen boughs to place on it should I need them. I wondered about the value of the signal fires, though, for I had tried using some of the green boughs on my campfire and noted that the smoke was quite white in color. It seemed to blend in with the snow quite well and I didn't know if anyone could see the smoke if I did set them off. For breakfast that morning I ate some of the candy ration and drank hot tea.

At the time I baled out, I was wearing a normal tee shirt and shorts, the standard two-piece quilted insulated underwear, winter flying suit and winter jacket. I had on two pairs of socks and was wearing the white rubber "Bunny Boots"; I was wearing summer flying gloves with winter flying gloves snapped in the inside flying jacket pockets. Even though it was quite cold, I was warm as long as I moved around. If I stopped for quite some time, my feet would start to get cold in the "Bunny Boots." I had never worn mukluks before and was a little skeptical about wearing them, but I thought I would give them a try. After putting them on and trying them, I never changed back to the "Bunny Boots" again. I had exchanged my winter flying gloves for the mittens that were in the kit, and found them much warmer. Also, I was wearing the wool knit hood and it kept my head very warm.

Many aircraft were in the area during the second day. At times the choppers were within one-quarter to one-half mile of me, but flying well below me in the canyon. I could see the blades flashing through the treetops but they were just too low to see me or for me to even shoot a flare. The C-54 or C-130 that was searching in the area seemed to be flying an awfully big search pattern. I could see him two or three miles away and I thought that if he would continue on the way he was going and then make a turn and come back, he would just about fly over me. But the next time I would see him, he would be several miles the other side of me. I'm sure he had a good reason to be flying that pattern, but at the time, I just about gave up on him. I did fire off two smoke flares the second day, one at a C-54 or C-130, and the other

I fired a flare at the aircraft, but no one saw it

at a helicopter, but no one saw them. This depleted my supply of three day smoke flares. During the afternoon I saw a helicopter working across a river to the north of me. Whenever there were aircraft in the area I was using every signaling device I had to try and get someone's attention. This included both radios [SARAH and URT-21], signal mirror, flares, and signal fire. I only turned on the radios when I could either see or hear aircraft in the area, as I was trying to make the batteries last as long as possible. The chopper seemed to keep working the same area which was only about three to four miles from me. I saw him climb quite high and drop a smoke flare and I thought he must have the general area spotted where I was and must be picking up one of the radio signals, but shortly thereafter he flew off. I found out later that he was marking a spot for a fuel drop by a C-130.

I climbed to the top of the ridge and walked all along it trying to see a cabin or building somewhere, but all I could see was snow, not even any smoke. I gathered as much firewood as I could, but it was starting to be a problem. I had already used the standing dead timber in the immediate area and the snow was so deep I couldn't get to a lot of the other wood. But I didn't try to keep a fire going all the time and managed to get by.

I looked for wildlife in the area and saw some rabbit tracks and two or three flights of Ptarmigan. I couldn't even get close to the rabbit tracks as I would sink up to my shoulders in the snow and all I had was a .38 to shoot the Ptarmigan with. There wasn't a survival rifle/shotgun in the kit.

I cut down several green trees with one of the wire saws in the

Some jobs took quite a while to do, but I had plenty of time for them

kit and it worked very well, much better than the normal saw. I cut the trees up into logs about three feet long and used the logs for a base for my fire. The trees weren't very big though and it wasn't long before the green wood caught on fire and soon I had a hole about four feet deep right in front of my tent where the fire had sunk into the snow. I was really wishing for a good piece of metal to build a fire on. It would have solved a lot of problems.

During the second day, I especially felt the need for liquids. I melted snow in the ration tin and it seemed all I did was drink . . . tea, coffee, or even plain snow water. I wasn't hungry, but I couldn't get enough to drink.

I thought I might be a little warmer the second night if I used my parachute to make another sleeping bag, so I climbed back to the top of the ridge and brought down the portion of parachute I had used for a signal. I made a sleeping bag, put the walk-around bag inside of it, and was somewhat warmer the second night. During both the first and second nights I put SARAH and URT-21 radios in the sleeping bag with me to try and keep them warm. During the daytime I either had them setting by the fire, or, when possible, inside my jacket. I had given up on the SARAH though as now the battery was only putting out for a minute or so before it would quit. I was wishing for some type of indicator on the URT-21 so I would at least know if the set was working. During the second night I got rather disgusted with the search aircraft. I would get in the sleeping bag and get warm and just about to sleep when I would hear an aircraft. Since I didn't know exactly where he was going, I would crawl out of the bag, take my signaling equipment outside and he would be going the other direction. I would get back in the sleeping bag and just about doze off and another one would come along and I would do the same thing again. This went on for quite some time and I got to a point where I wished they would just go away and leave me alone and come back in the morning. Of all the aircraft that came somewhere in the area that night, only one came close. I had tied the strobe light on a small tree about 18 inches above the snow and when I turned it on, it really made a bright flash. I also fired a flare at the aircraft, but he didn't see either the strobe or the flare. The search aircraft finally gave up for the night and I managed to get several hours of sleep, although I still got cold at times.

The third morning I thought, "Well, maybe today is the day," so I got up quite early. I remade the signal fire that I used on the second day in hopes that I would have a chance to use it. Again there was a lot of activity. I didn't know how many aircraft they had out, but there seemed to be quite a few in the area. The SARAH battery was completely dead when I checked it and I suspected that the URT-21 wasn't working at all or someone would have heard it on the first or second day. I had used quite a few flares and was starting to get a little concerned about the number I had left. I had made up my mind that I would have to save them

until an aircraft was coming directly at me before using one.

I took the part of the parachute that I had used for a sleeping bag back up on the ridge and tied it down. The wind was blowing hard and it was a job. The third morning was the first time that I noticed a loss of strength. It took me longer to do things and I would get tired easier. But, again, I wasn't hungry, just thirsty and I drank a lot.

I tried to keep as busy as I could and the hours flew by. I was warm until I would stop moving and then I would get cold. I would saw a little wood or get more green boughs for the signal fire or anything to keep moving and keep busy. I still wasn't hungry but ate a little of the candy ration anyway. And it seemed I was almost constantly melting snow to get some water to drink.

About 1500 hours I saw a C-123 fairly close and headed in my direction. I turned on the URT-21 radio and used the signal mirror to try and signal him. He kept coming closer and I fired a pen gun flare, but he kept on going and I was sure he had missed my signals. However, finally, he made a 180° turn and flew back towards me. Again I used the mirror and fired another pen gun flare, but the aircraft didn't even so much as dip a wing, but kept going. This time the C-123 went even farther and I thought "Here we go again!" but it turned back. I started one of the signal fires and used the night end of the day/night flare along with the radio and signal mirror. Again, the aircraft flew almost over me without even so much as rocking his wings, but then I heard a chopper approaching and was quite sure the C-123 crew had actually seen me. Sure enough, within a very few minutes two helicopters flew up from the valley below and set down on top of the ridge. For a moment I thought about going down to my shelter and getting a few of the items I had there, but suddenly they didn't seem important any more and I started up the hill to meet two of the crew that had started down the slope. After that it was back to Galena and a hot bath followed by a good night's sleep. The people at Galena even had a big celebration scheduled for me that night, but I couldn't make it, I was just too tired.

SUMMARY

The weather during the period of time I was in the bush was generally pretty clear with occasional snowshowers. I had no way of knowing how cold it actually was, but I did realize that it was quite cold. The eye hole in the wool knit hood would get almost frosted over and I would have to take it off and brush the frost off. At times it would get quite icy and I would hang it on a stick over the fire and melt the ice off and completely dry it out. When I arrived back at Galena, I was told it had been 45° below zero in the area where I was located.

The winter flying gear I was wearing was quite adequate. I did get cold, but it wasn't so bad that I couldn't cope with it. I didn't wear the walk-around sleeping bag during the daytime, just my winter flying gear. I was quite comfortable as long as I would move around a little, but I would get cold if I stood in one spot for a long period of time. I found the mukluks to be much better than the "Bunny Boots." Although my feet were not quite as warm in the mukluks as in the "Bunny Boots" while I was walking, my feet would stay warm in the mukluks when I stopped, but would get cold quickly in the "Bunny Boots." The mittens that were in the survival kit were much warmer than the normal winter flying gloves, and I wore them almost the entire time. To protect against frostbite, I would change my socks four or five times a day. I had on two pairs of socks and there were two other pairs of wool socks in the kit. I would take off the two pairs I was wearing, and put on the other two pairs even though my feet weren't cold or the socks wet. I would dry the two pairs I had taken off over the fire before putting them away for my next change. If I had to take my mittens off to tie a knot or something, I was careful not to let my fingers get too cold before putting the mittens back on again, even if I didn't get the knot tied the first time. Sometimes it would take me quite awhile to get a job done, but I had lots of time. I tried to keep covered all the time and was especially careful about my face, ears, fingers, and feet. By using these methods, I managed to make it without any frostbite whatever.

The food that was in the kit was the standard candy ration. There was also one chocolate bar, along with two bouillon cubes, tea, and coffee. At the time I was picked up, I still had well over half of the candy ration left. I just wasn't hungry, even though I knew I should eat it to keep my strength up. More important to me were the bouillon cubes, tea, and coffee, and I had used all of these items except one package of instant coffee. I certainly wished there had been more in the kit.

The life raft made a pretty good mattress as long as the LPUs were inflated and inside it. But the LPUs wouldn't hold air throughout the night and it would get a little uncomfortable due to the sag in the middle. The pads I used on top of the raft helped a great deal to insulate me from the rubber itself.

I feel that the training I had received at both the water survival schools I have attended helped me a great deal, especially the ejection and post-ejection procedures. I have never attended a winter survival school. However, I definitely feel that my own background helped more than anything in surviving. My home is in Idaho and I have done a great deal of hunting, fishing, and camping in both summer and winter, and snow and cold weather are quite familiar to me. Although I have never had to contend with temperatures nearly as extreme as those I encountered in Alaska, there was no question in my mind as to what I should do. Also, I have read a great deal on winter survival and thought a lot about what I would do if forced down into that environment. With the equipment I had, I feel I could have survived quite a few more days if it had been required. I tried to keep as calm as possible and as busy as I could. Actually, the time went very fast as there was always something to do. My spirits would sag a little when a rescue aircraft would come close and not see me, but I realized what a big area it was and how hard it must be to find one man. I definitely felt that I would get picked up, it was just a matter of time.

I still can't understand why some of the aircraft didn't see or hear my signals, but after I had been picked up some malfunctions were found in the radios. The strobe light was extremely bright at night with the snow as a background, but still no one saw it. I had problems with the rings breaking off the day/night flares and had to use a piece of metal to finally pry the tops off so I could use the flares. This happened on three of the five day/night flares I used. I used five

I wasn't hungry, but knew I should eat

of the seven pen gun flares and all of them worked except one which was a dud.

Finally, and perhaps one of the most important things to me, was that I knew how to pray. My father was a minister and I practically grew up in a church. I learned to pray when I was quite young and it is something I practice every day, and I certainly prayed during that 51 hours. To me, it was a very comforting thing to do and I was glad I already knew how to pray and didn't have to try and learn in a situation like that.

I'm sure that many other people faced with the situation I was in would have done things differently, and probably their solution to the problems I encountered would have worked just as well, if not better than the procedures I used. However, I usually had a pretty good reason for doing the things I did, and even now, several weeks after it all happened, I really can't think of anything I would have changed. I sincerely hope that no one else is faced with the experience I had, but if it should happen, I hope they will remember that there was another pilot in the same position once. He made it and they can too.

I hurried up the hill to meet my rescuers

FLIGHT OFFICER RETENTION

Captain William H. Zierdt, III

THOSE OF YOU who have been around the trade a few winters lean back and picture a warrant officer. What do you see? A man of about 30 with 10 years or so of service. Probably he had been an outstanding NCO and was tapped to be a technician. He has a deep knowledge of his field, a high experience level, and the ability to handle the people who do the work.

Now step outside your hootch and look around. What do you see? Most of the warrants with wings are about 22. They probably have a year or two of college and a little over a year in the service, with most of that time in school. And driving a third of a million dollars worth of aircraft around the sky with 12 souls on board is a lot more responsibility than you or I had when we cracked our first legal can of beer.

Can these two diverse groups, both warrant officers, be satisfied with the same advancement system and grade scale? The answer, obviously, is no. The warrant system now in effect was designed for men who came from the ranks with a wealth of practical experience and an expectancy to stay in the Army another 10 or 12 years. The system admirably fits these requirements and gives our ablest NCOs with a technical background a chance for greater pay, better retirement, and a higher social position. In short, it retains a lot of our best qualified men who may otherwise leave the service.

This system is not designed to retain the young man with 20 or more years ahead of him and training in a fine trade. A maximum of three promotions spread out over 20 years and the same position on the TOE at age 40 as at 20 is not a future that most of us would readily accept.

Right now the schools at Fort Rucker and Fort Wolters are turning out rated warrant officers at a rate unforeseen two years ago and at an expense that is equally advanced. To derive the maximum from these men we have got to retain them well beyond their obligatory term of service. Therein lies the purpose of any system of advancement and personnel management.

To keep these men motivated and interested in a lifelong career as Army Aviators is the problem and desire of every aviation commander in the field and, I suspect, of paramount interest all the way to DCSPER level. Money is not the key; professional orientation is. Let's attack the system in use and see if we can't get a better shake for both the aviator and the Army.

First, the grade structure. There must be at least five grades to which these men can aspire. For lack of a more original name, we will refer to them as "Flight Officer" grades one through five. Across this spectrum can be liberally spread the terms "Senior Flight Officer" and "Chief Flight Officer." Assuming a man's retainability in the service to be about 24 years, the entire first year to be spent in basic training and flight school (Flight Officer Candidate School), will give a career pattern somewhat as depicted in the chart.

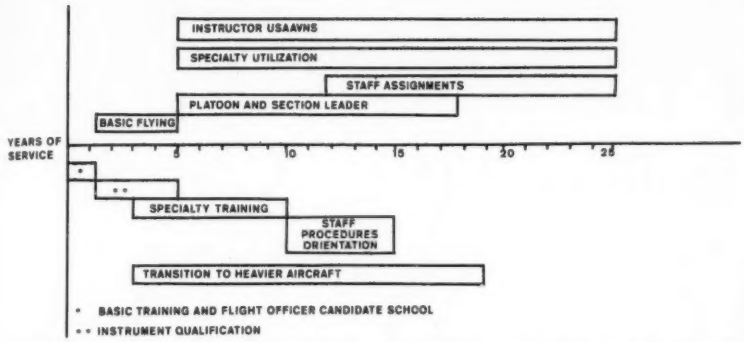
Promotion to Senior Flight Officer, grades F-3 and F-4, would be somewhat accelerated and could be done by board selection with a passover rate and provisions for qualified but not selected similar to the promotion system for commissioned officers stepping into the same numerical grade. The same provisions would apply for promotion to Chief Flight Officer, F-5. This latitude in being able to promote an individual on one of two or more successive promotion lists, coupled with a provision for selection from secondary zone for promotion to grades F-4 and F-5, would make this a highly competitive system with quite good rewards for outstanding performance.

Obviously to institute this type of promotion system, the selection board would require more than job performance in flying positions on which to base their selections. This brings us to the present weakness of having all grades of warrant officers in the same TOE position with little provision for increase in responsibilities assumed. Additional rank without a commensurate increase in responsibility and authority is essentially meaningless. All technical positions within the aviation field should be filled by flight officers as they advance to an appropriate level.

Additionally, command assignments to the platoon level and junior staff assignments at battalion, group and brigade level

---

CPT Zierdt is an instructor with the Armaments Division, Dept. of Tactics, Fort Rucker, Ala.



should be available to the flight officer. These technical assignments would include maintenance officers, instructor pilots, instrument examiners, safety officers and, possibly, avionics and navaid maintenance officers. These specially trained personnel would remain within their specialized fields of aviation, becoming true experts and relieving commissioned officers to their primary command or staff assignment.

Flight officers moving into specialized positions within aviation would receive school training for the specialities while at the F-2 level. By assigning these responsible and specialized positions to flight officers, the loss of these skills in a commissioned officer on rotation to ground duty would be eliminated. Being an effective instrument examiner, for example, is a full-time job and one in which a commissioned officer on ground duty finds it difficult to remain current. Four hours a month in an O-1A hardly keeps one familiar with the constantly changing procedures and regulations of ICAO and the FAA. Likewise, a thorough knowledge of aviation maintenance procedures and CH-34 systems hardly helps some captain as a brigade headquarters commandant.

Another proposal is to have an aviator's qualification in more complex aircraft geared to his progress and demonstrated proficiency. It is not logical to have Chinooks and Mohawks crewed by two pilots right out of flight school while some well experienced aviators are qualified in observation aircraft only. Many reasons support the idea that new aviators should begin their careers in light aircraft with the prospect of progressing to more complex equipment as their experience develops.

The aviator's "air sense" will generally develop faster in lighter aircraft because the missions assigned are shorter, requiring more landings under many different conditions, and because no one else is in the cockpit to rely on when the going gets rough. If the young pilot flies himself into bad weather, he must fly himself out. Also, light aircraft are generally more forgiving than their larger cousins and are more easily parked in a pasture while a storm blows over. The most obvious reason for this progression is probably the least valid, but it is definitely a consideration: heavier aircraft are a lot more expensive to repair when the experience gathering aviator becomes too spirited.

Because many more light observation and utility aircraft are in the inventory than heavy cargo aircraft, many old hands will be available in the units with these lighter aircraft to furnish guidance to the new aviators. Placing a higher experience level in units equipped with heavier equipment will enable aviators to concentrate more on the complexities of their aircraft with less conscious thought needed for air traffic control procedures and vagaries of the weather. The progression to heavier equipment would ensure more efficient operation of aircraft. It would also serve as some recognition of an aviator's demonstrated proficiency.

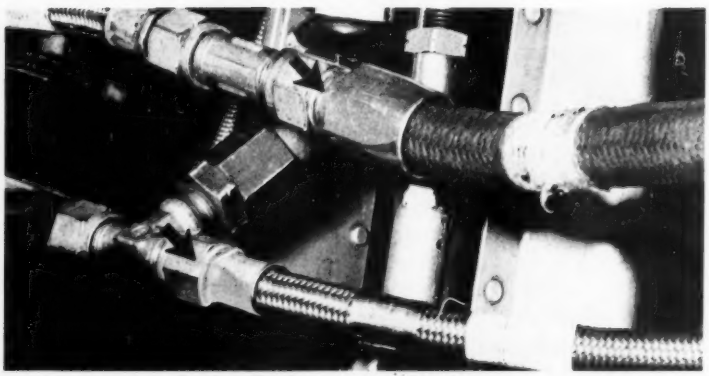
To prepare flight officers for the responsibility and authority proposed, necessary changes are needed in the training they receive. (This was emphatically pointed out to me by nearly all of the 15 recent graduates of WOC training who read early drafts of this article.) Early stages of training must more closely parallel officer candidate school, and throughout the course more emphasis must be placed on general military subjects.

Warrant officers currently being rated as aviators are entirely satisfactory pilots. However, their knowledge of the Army and military procedures is lacking. Military courtesy, wearing of the uniform and the gentle art of "on-the-spot correction" are as important to the "officer" in the title as low level autorotations and temperature inversions are to the "flight."

We must keep in mind that Army aviation is in competition with the rapidly expanding general aviation field for the services of these professional aviators. The requirements they must meet to enter flight training ensure that the men we qualify are capable of being much more than "aircraft drivers." It is these same abilities and ambitions that will make a man restless if he is not given the proper challenge and recognition in later years. To retain these men we must recognize their above average capabilities and design a career program taking full advantage of their potential.

Would You Believe FIVE?

Overlooked



Crossed CH-34 Servo Hydraulic Lines That Caused

$35,420.00 Accident

crash sense

PREPARED BY THE U. S. ARMY BOARD FOR AVIATION ACCIDENT RESEARCH

CH-34C TEST PILOT: "The crewchief and I preflighted the helicopter and found no abnormalities. I started the engine and after a warmup period of 4-5 minutes, pulled the ASE circuit breaker. I engaged the rotor. Although the engine oil temperature was 40°C, the clutch slipped twice. After this, normal engagement was achieved at 1700 rpm.

"While draining the clutch, I moved the flight controls to check for proper response and noted that when moving the cyclic from aft to forward, the collective pitch stick went up simultaneously for a maximum of four inches. I pointed this out to the crewchief who was sitting in the copilot's seat and we agreed it was not correct.

"When switching off my primary servo power, I did not notice an abnormal condition or feeling. The auxiliary servo was working correctly.

"I then went back to the BOTH position and again felt mixing of movements in cyclic fore and aft in relation to the collective stick upward motion. At this point, I remember clearly I told the crewchief, 'Let's look it over before we take off.' I wanted to make an auxiliary servo shutoff to see if I was getting the correct response in PRIMARY ONLY. When I turned the auxiliary switch off, the collective went up full speed. I think I had my feet on the floor and rose to try to get the collective down, and switched back to BOTH ON. However, the shoulder harness prevented me from getting up. The helicopter went up and rolled to the left with the nose up. The rotor blades hit the ground, the helicopter came to rest on its side, and I climbed out as fast as I could . . ."

Investigation narrative: ". . . Although there was no fire, precautionary measures were taken by the fire department because fuel was seen spewing from the overflow drain line . . . .

"A preliminary examination of the main wreckage was conducted by the investigation board, together with an interview of the pilot and crewchief. It was determined that aircraft restraint equipment and protective helmets had been used by the pilot and crewchief. The engine and transmission had been functioning properly prior to impact. Sudden stoppage of the engine was caused by the clutch not disengaging, thereby providing a direct drive between the transmission and engine. The ASE circuit breaker had been pulled by the pilot prior to turning on the main inverter and at no time was the ASE equipment turned on.

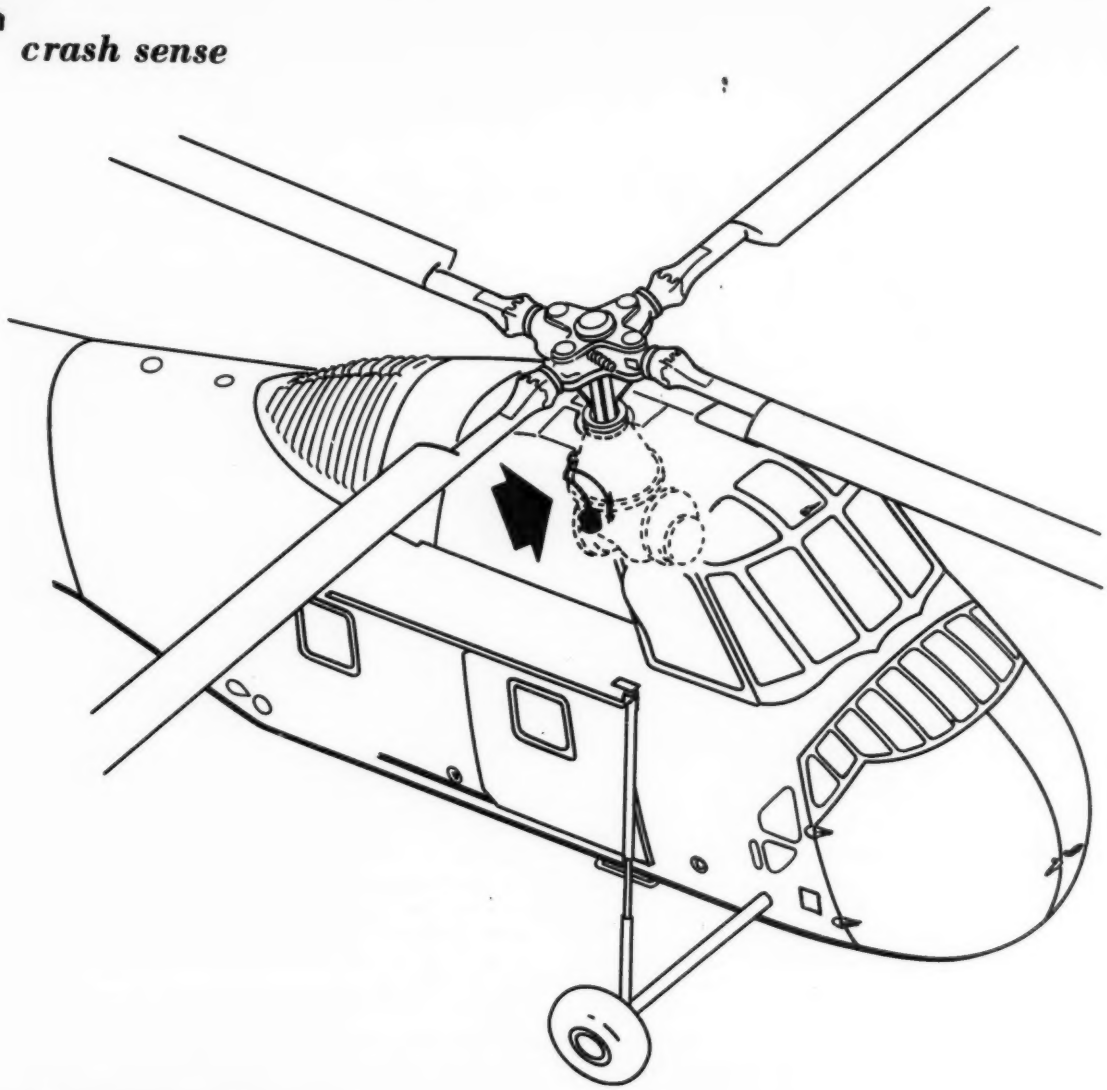
"Examination of the left lateral servo by a board member revealed a possible maintenance error. A positive conclusion was reserved until the aircraft could be erected and a thorough inspection performed by a qualified technical inspector."

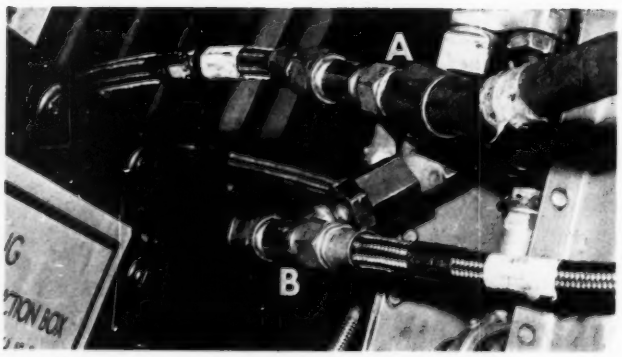
NOTE: Immediately after the aircraft was righted, a technical inspector found:

"1. Primary hydraulic pressure switch loose in housing.

"2. Left lateral servo pressure line attached to return low pressure fitting, return line attached to high pressure fitting.

"Further investigation of the main wreckage revealed that the tail rotor assembly had been damaged beyond repair, the tail pylon severly damaged, the main rotor blades and head damaged beyond repair, and three bellcrank assemblies either bent or broken . . . ."





Low pressure line (A) was attached to high pressure port and high pressure line (B) was attached to low pressure port of CH-34 left lateral primary servo

" . . . any situation in which differentiation of two objects must be made on the basis of a right-hand, left-hand relationship is highly subject to error."

Analysis: "In the opinion of the board, this accident was caused by the reverse connection of the primary servo system pressure and return hydraulic lines to the left lateral servo (i.e., the low pressure line connected to the high pressure servo port and the high pressure line connected to the low pressure servo port).

"A preflight was performed jointly by the pilot and crewchief. The crewchief inspected the left side of the helicopter and the pilot the right side. No special attention was given to the installation of the left lateral servo for which the functional test flight was scheduled. This was the start of the accident as far as the pilot's role was concerned.

"Admittedly, the average pilot performing a normal preflight may not have noticed the incorrect connection of these hydraulic lines. However, this flight was scheduled for the express purpose of determining airworthiness as a result of the removal and installation of the left lateral servo . . . DA Form 2408-13 clearly indicated the reason for the functional test flight and the pilot should have inspected the left lateral servo installation very closely.

"The pilot was highly qualified in this helicopter type and model and had spent several years performing functional test flights. He was thoroughly familiar with preflight and test flight procedures.

". . . At some point between the time that extreme flight control pressures were experienced and the aircraft rotor blades struck the ground, the pilot returned the servo selector switch to the BOTH position. It is the opinion of the board that if the pilot had concentrated his efforts on immediately returning the servo selector switch to either the BOTH or PRIMARY OFF positions instead of rolling off throttle, he might have regained control of the helicopter in time to avoid ground contact.

"The board suspected that the reverse connection of the primary servo system pressure and return hydraulic lines to the left lateral servo caused reverse control movements. To prove or disprove this suspicion, the board requested the hydraulic shop to install a serviceable CH-34 servo on its test stand and connect the pressure and return lines in reverse. This was accomplished and it was noted by the board that in addition to a constant bypass flow of hydraulic fluid, all induced movements to the servo resulted in opposite motions. In the opinion of the board, there was sufficient differential pressure, input vs output, to cause this condition.

"To further substantiate this finding, a similar test was conducted on another CH-34C, using two portable hydraulic test stands and an APU. The pressure and return hydraulic lines were again connected in reverse to the left lateral servo. The auxiliary servo system and the primary servo system pressures were set at approximately 1,500 psi for the test. With the servo selector switch in the BOTH position, the cyclic and collective pitch controls moved normally. However, when the auxiliary servo system was turned off, the cyclic moved from a near centered position to a full left rearward position despite all efforts to stop its movement. It was also noted that if the collective pitch control was held in a position above neutral, and the auxiliary system turned off, the collective moved full down.

"The pilot had returned the collective pitch to the down position as a result of an upward movement when the servo selector switch was in the BOTH position. Undoubtedly, therefore, he was exerting some down pressure on the collective pitch at the moment he moved the selector servo switch from PRIMARY OFF to BOTH to AUXILIARY OFF. This factor, together with the stick jump caused by turning off the auxiliary servo system, resulted in the abnormal control movements which the pilot could not physically overcome. . . .

"Additional factors:

"The primary cause of this accident is a poignant reminder of what results when there is a departure from standard procedures. The degree of maintenance performed on this helicopter required that a hydraulic test stand be used to determine the proper functioning of the primary and auxiliary servo systems. This was not accomplished.

crash sense

"The local maintenance SOP provided for inspection by both a supervisor and technical inspector of any maintenance performed by a mechanic for safety-of-flight discrepancies. This procedure was followed. However, both the supervisor and technical inspector failed to detect the error."

Flight surgeon's analysis:

"It is quite evident that the primary cause factor is the reversal of the high and low pressure lines to the left lateral primary servo. The sequence of events which allowed this murphy to progress to a full grown accident were:

"An incompletely trained mechanic, performing the actual installation under the supervision of an experienced supervisor, had not yet been taught the need to trace out all servo connections to assure correct installation, and used the relative positions of the lines as a guide to installation, assuming that they had not shifted since dismounting the servo.

"The supervisor, as part of the OJT portion of the mechanic's training, gave advice and instruction for the removal and installation, and insured that the part actually was removed, inspected as required, and reinstalled. He did not attempt to inspect the finished installation for correctness, leaving this to the technical inspector as his area of special competence.

"A highly experienced, competent, and conscientious technical inspector examined the installation, manually testing the lines for tight coupling and correct connection, and saw nothing wrong. He denied any illness, unusual fatigue, worries, or pressure to perform the inspection in a hurry, or other sources of distraction. Although he could not recall having been presented with an aircraft with this specific misinstallation previously, he had detected servo misinstallations and defects frequently in the past. Even after the fact, he could not imagine himself missing this murphy, as it was immediately apparent to him in the photographs.

"An experienced CH-34 crewchief preflighted the aircraft, lowering the platform and inspecting the transmission, but he did not specifically check the left lateral primary servo, although he knew that the test flight was to check its installation. He said, 'The technical inspector checked it, and he knows more than I do.'

"The test pilot, with years of experience as a test pilot and more than 800 hours of CH-34 time, accepted the crewchief's preflight without questioning him as to a specific examination of the left lateral primary servo. In running up the aircraft, an abnormal control response occurred immediately upon moving the servo selector switch from the BOTH to the AUXILIARY OFF position. He reacted inappropriately, concentrating on trying to forcibly restrain the control response, and only at the end restoring the selector to the BOTH position.

"These events were all requisite to the accident and their smooth coordination, viewed retrospectively, seems miraculous . . . . Let us see where this sequence could have been blocked and how:

"The mechanic could have been better trained. He will be soon, as he was scheduled for formal classroom lectures and demonstrations on servo systems the week following the accident. However, this facility must continually train personnel if it is to keep operating, and so it will have to have personnel in training in all aspects of its operation, and rely on supervisors and technical inspectors to prevent or detect errors.

"The supervisor might have continuously watched the mechanic throughout the installation, or carefully inspected it afterwards. However, he has other less skilled workers to assist and cannot be with each one continuously, or spend large amounts of his time performing the duties of the technical inspector. He will be well advised to emphasize the actual tracing out of servo lines in training new men in servo installations in the future, but he cannot be expected to teach a man everything about a given aspect of maintenance in one sitting.

"The technical inspector might have been more careful in his check of the installation. I doubt that this is a valid recommendation. There is no reason to think this man was careless or hurried in his job. The check was performed at about 1500 hours local time, and he had only one more inspection to perform that day. He was feeling well, had eaten a hearty lunch, had no family, financial, or unit problems, and did not feel any urgency to get this ship inspected and out. He felt that he performed a normal inspection, including tracing the lines by taking one in each hand and running his hands along to the other end of the lines. He could not understand how he made the error. The picture in his mind, as he recalled his inspection, was still of a perfectly normal installation, and I rather suspect that he had a lurking feeling that someone deliberately sabotaged this ship after he had inspected it.

"I think that the problem here is the common one of extreme familiarity with the system involved, leading to such a detailed mental image of the correct installation that the mental picture suppresses realization of the actual scene. Also, any situation

" . . . the only valid approach is to modify the critical part involved, and all other CH-34 servos, so that they can only be installed one way . . . "

in which differentiation of two objects must be made on the basis of a right-hand, left-hand relationship is highly subject to error. Most humans have a life long weakness in spatial relationships, and a persistent tendency to mix right and left.

"Everyone has, I believe, had the experience of having two similar objects side by side, confidently identifying one as the desired item for a given purpose, and then marching off triumphantly with the wrong item. In all walks of life, this type of problem is recognized as common and troublesome, and various tactics are introduced for control. Successful control measures usually involved imparting distinguishing characteristics to the objects themselves. I do not believe that any amount of training or care can eliminate the propensity to human error in making a right-left test of identity.

". . . The crewchief should have performed a better preflight. Granted, but with no assurance of detection of the defect. Preflights are often performed under adverse climatic and lighting conditions, and crewchiefs are often only OJT trained. Primary reliance for detection of maintenance deficiencies prior to release of aircraft for flight should rest with the technical inspectors, who are established as a group of experts assigned to maintenance operations because of the difficulty of creating a system in which all crewchiefs have long experience and school training. The crewchief and pilot must take all possible steps to detect any equipment defects in the preflight, especially where a maintenance test flight is performed, but their preflight should not be relied upon to screen out all maintenance errors.

"The test pilot should have been more alert to the performance of a specific inspection of the servo as part of the preflight. However, test pilots tend to feel that the best way to check an aircraft is to check it in function, because the problems they encounter are commonly those which are difficult to identify while the aircraft is static. Knowing that a good technical inspector had checked the ship, the test pilot's reaction would be to look for maladjustments and dynamic malfunctions of the part. This accounts for the fact that he observed the abnormal flight control response initially, and repeated the maneuver which precipitated it in order to observe it further. This is a manifestation of the test pilot's basic orientation, a persistent human factor which cannot be eliminated. Each pilot develops his own approach to test flying aircraft types, based on the board guidelines of the −10. Test flying could only be standardized by instituting a formal school for each aircraft model. . . .

"The test pilot should have automatically responded to the terminal control response by moving the selector switch back to the BOTH position. This is specifically emphasized in the manual for the model, and seems an obvious response. In view of the pilot's stated long experience in this model, this indicates some failure to study the manual, and again reflects the lack of standardization of test piloting. However, we must remember that at this moment the pilot was in the middle of an accident which was threatening to ruin his whole morning, and he may have felt just a bit excited.

"Overall, it would appear that the pilot involved needs to devote further time to a study of the aircraft manuals, and to evolving a more careful approach to the performance of test flights. It is not clear, however, that either a more detailed preflight, or prompt switching of the servo selector, would have prevented this particular accident, or would offer control of all servo murphy accidents.

"I have, with obvious malicious intent, proposed many aspects to the prevention of this accident solely for the purpose of rejecting them. I feel that the only valid approach is to modify the critical part involved, and all the other CH-34 servos, so that they can only be installed one way. . . .

"Both pilot and crewchief were wearing the sage green flight suit. However, fire retardant treatment of flight suits still has not been provided as a laundry service in this area, although institution of this service has been directed, because the laundries have been unable to obtain one of the requisite chemicals. These flight suits were not treated after laundering and so would not have afforded maximal fire protection. . . .

"The failure of the pilot to wear boots and of the crewchief to wear gloves must be written off as plain foolishness. . . ."

STACKED DECK

THE OD HAD A CALL REQUESTING HELICOPTER EVACUATION OF A PATIENT FROM A SNOW-BOUND HOME TO AN AMBULANCE PICKUP POINT. HE ALERTED OPERATIONS AT THE NEARBY AIRFIELD AND A UH-19, WITH A PILOT AND CREWCHIEF ABOARD, TOOK OFF AT 0310.

FIVE MINUTES AFTER TAKEOFF, THE PILOT ESTABLISHED CONTACT WITH ANOTHER ARMY AIRFIELD AND WAS TOLD TO PROCEED TO A SCHOOL HOUSE, MAINTAINING ENOUGH ALTITUDE FOR VISUAL CONTACT IN A FIVE MILE RADIUS. HE WAS TOLD A POLICE CAR WOULD BE AT A ROAD INTERSECTION WITH ITS RED DOME LIGHT ON AND THE HOUSE WOULD BE ONE-HALF MILE FROM THE CAR. A MAN WITH A FLASHLIGHT WAS TO BE OUTSIDE THE HOUSE.

AT 0320, THE PILOT REPORTED EN ROUTE TO A SMALL TOWN. AT 0340, HE SAID HE WAS IN A SNOW SHOWER, WAS IFR, AND WAS PARTIALLY DISORIENTED. HE TURNED AROUND AND FLEW OUT OF THE SNOW SHOWER. AT 0350, HE REPORTED HE WAS AGAIN EN ROUTE AND WAS TOLD THE POLICE WOULD LIGHT FLARES TO MARK THE INTERSECTION. AT 0400, HE CALLED FOR A DF STEER, BUT WAS UNABLE TO GET IT BECAUSE HE ONLY HAD UHF AND THE ONLY AVAILABLE DF EQUIPMENT WAS VHF. AT 0410, HE REPORTED ORBITING WEST OF A TOWN AND AT 0415, HE SAID HE HAD THE FLARES IN SIGHT AND WAS LETTING DOWN. THE LIGHTS HE THOUGHT WERE FLARES WERE POSSIBLY FROM A TRUCK AND HE CONTINUED WEST ALONG THE HIGHWAY. AT 0425, HE REPORTED HE HAD ENCOUNTERED SNOW AGAIN, WAS IFR, AND DISORIENTED.

THE MAIN ROTOR BLADES STRUCK THE SNOW COVERED GROUND AND THE UH-19 HIT TREES, CRASHED AND BURNED. THE PILOT WAS KILLED AND THE CREWCHIEF ESCAPED WITH MINOR INJURIES.

THIS IS ANOTHER CASE OF A PILOT STACKING THE DECK AGAINST HIMSELF AND GAMBLING HIS LIFE. HE LET HIS EAGERNESS TO PERFORM THE MISSION TAKE THE PLACE OF SOUND JUDGMENT AND PLANNING. ALTHOUGH HIS 759 REFLECTED NO PREVIOUS UH-19 NIGHT FLYING TIME, HE ACCEPTED THIS FLIGHT AND TOOK OFF WITHOUT CHECKING THE EN ROUTE AND DESTINATION WEATHER. INSTEAD OF TURNING AROUND AND LANDING AFTER HE FIRST FLEW INTO A SNOW SHOWER AND LOST ORIENTATION, HE ELECTED TO TRY AGAIN. THEN HE BECAME LOST AND GOT TOO CLOSE TO THE GROUND WHERE THE ROTORWASH STIRRED UP FRESH POWDERED SNOW, CAUSING HIM TO LOSE VISUAL REFERENCE. THAT'S WHEN HIS LUCK RAN OUT AND HE LOST HIS GAMBLE TO THE STACKED DECK!

JUNGLE SURVIVAL

"It seems that I was on top of the trees almost immediately. I remember one tree striking the underside of the 'copter. I remember nothing else until I awoke on the ground."

OH-23F pilot: "The mechanics had completed refueling and the passengers were strapped in their seats. As I approached the ship, I asked how much fuel I had on board and was told 20 gallons by one of the mechanics. I did not check the fuel quantity with the dipstick or the security of the filler cap. After starting and the usual runup checks, I took off, with another pilot following in an OH-23F.

"We proceeded east and turned south as planned. The other pilot flew to my right and, after a right turn to the south, was approximately 50 yards ahead of me. After the turn to the south, I thought I could see the helipad in the distance and slightly right of our heading. I made a correction to the

right to proceed directly to the pad. I crossed behind the other OH-23 from left to right as he continued on the original heading. Holding our individual headings, we were separated by 3 or 4 miles by the time I realized that I was in the wrong area. I turned and proceeded in the direction to rejoin the other OH-23. The pilot had discharged his load and was coming towards me. He led me to the pad and I dropped my passengers.

"We departed the pad together and proceeded north. I was using 24 inches manifold pressure and 3200 rpm to maintain position with the other helicopter. Our airspeed was about 75 knots, according to my airspeed indicator. We made a turn to the west. As I was crossing a ridgeline at about 50 feet, the engine quit suddenly with no prior warning.

"My recollections of the next few seconds are pretty hazy. It seems that I was on top of the trees almost immediately, though sometime during the short descent I thought about rpm and think I lowered the pitch stick. I do not remember flaring or pulling pitch. I remember one tree striking the underside of the helicopter. I remember nothing else until I awoke on the ground.

"When I came to, the other helicopter was circling overhead. I removed my pencil flare gun from the lower right pocket of my flight suit. I had to cut the pocket with my hunting knife to get it, as the zipper was held by the instrument panel which also was pinning my right leg against the forward corner of my seat. I tried to fire a flare out through the broken bubble and up through the trees, but it did not clear the trees.

"Thinking I would have to get into a better position to fire the flare gun, I proceeded to try to free myself from the aircraft wreckage. I released my seat belt and tried to free my leg, but it was securely pinned. I got back into the seat and fashioned a sling around my chest using the shoulder straps from the rear seats.

"I stayed in this position in the seat for some time, thinking about my predicament and taking inventory of the equipment I had available. I found my helmet, which I am sure stayed on my head throughout the crash, and my sunglasses, which were broken. I applied insect repellent to my face, neck, and hands. I removed the fire extinguisher from its bracket and placed it within easy reach in case of fire, or if I needed it as a weapon. I opened the first aid kit and applied antiseptic to the scratches that I could see. I realized that the rapidly approaching darkness would probably prevent rescue until the next morning.

"I moved out of the seat again and tried to free my leg. Pulling on the leg proved useless. The seat was securely bolted to the floor and could not be moved. I dug under the instrument panel but found it to be resting on a large tree root so I could not force it down and away from the leg.

"To improve my body position and provide some comfort, I ripped out the covering and foam rubber from the rear seat and the pilot's seat cushion and used these to support myself and to supply some warmth. I was able to shift my position to some extent by grasping the rear seat shoulder straps which were hanging overhead.

"I was able to obtain small quantities of water from leaves which I could reach through the broken bubble and later from a piece of foam rubber which I placed outside of the wreckage to absorb rain and drippings from the trees. I experienced no desire for food. I had four cigarettes which I rationed through the night, smoking the last at 0800 the following morning.

"I do not recall any periods of actual sleep throughout the night. I was constantly shifting positions as much as possible because of the discomfort of my awkward position.

"Soon after first light at about 0630 hours, I heard the U-1A approaching. When it got near, I was able to fire a flare which did clear the trees and was seen by the U-1A. Soon the helicopter arrived overhead and dropped something near the wreckage.

"A short time later, I heard the helicopter again working some distance away and surmised they were bringing in a ground rescue party. At 1000 hours the rescue party arrived at the crash site."

Escort pilot: "The pilot was approaching a ridgeline which was about 1,100 feet. I noticed he started to climb up the ridge. When he got to what looked like the top, he turned to the left and I lost sight of him. Not knowing whether he had gone over the ridge and out of sight or autorotated, I flew to the top of the ridge where I had last seen him and I looked over the ridge and couldn't see him flying. It was easy to follow one another because our rotary beacon lights were working.

"Weather was low scud at 2,200 feet, visibility was good, but there was some haze. Then I started to search the top of the ridge where I last saw him. I spent about 5 minutes hovering over the trees looking for him since there was no suitable autorotation terrain, except jungles with trees approximately 150 feet high. I saw a flash of red from the helicopter tail boom (fluorescent paint) and I

The pilot was pinned in the wreckage 16 hours. He fashioned a sling around his chest using the shoulder straps from the rear seats.

saw the helicopter had crashed straight down through the trees. I saw no sign of life. I circled the area for about 10 minutes, as I wanted to be sure I could locate the area again. I returned to the takeoff point. I had 6 gallons of fuel remaining so I refueled and took a helicopter mechanic back to the site and we dropped a survival kit.

"We returned to the takeoff point and attempted to find some rope to rappel a person or persons into the crash site. I felt we would need about 150 feet of rope, due to the height of the trees. We couldn't see the ground, even though the helicopter was visible from the air. We found 150 feet of rope at 1800 hours and it was then dark. That night we knotted the rope every 14 inches and this took about one hour. We got out the survival radios and checked them with the aircraft radios on 121.5 mc and they worked. We decided to rappel a mechanic into the site with the survival radio and kit to inform us about the pilot's status. We had an additional rope to drop a survival kit first, with a radio attached.

"We got up at 0500 hours and I flew the U-1A to the site. Upon arriving, we saw a flare come up through the trees and knew he was OK. I landed back at the takeoff point, got into an OH-23F, and took the mechanic and the ropes to the area and dropped the survival kit. We ran out of rope and let the kit fall the rest of the way. We realized we didn't have enough rope to rappel, so we decided

to build a pad at the closest available spot at the foot of the ridge and walk in. I dropped two people from the helicopter and they built a pad. I then took our two mechanics, four workers, and two soldiers with radios, stretchers, survival and first aid kits to walk in. They left the pad at 0830 and arrived at the site about 1000 hours and found the pilot pinned in the aircraft. They removed him and carried him by stretchers to the helicopter pad, a 4 hour trip."

The pilot was pinned in the wreckage 16 hours and suffered arterial and nerve damage to his right leg and received numerous other cuts and abrasions.

The primary cause of the accident was found to be fuel exhaustion.

Contributing factors were listed as:

"Not taking into consideration increased fuel consumption at high power settings.

"Weather, causing extension of flight time and misidentification of landing area.

"Underestimating required flight time.

"An inoperative fuel quantity indicator system.

"Fuel servicing and flying time kept by estimates and not by exact quantity of fuel used or time required for the flights.

"Inoperative communication radios not allowing discussion of route change between aviators."

Flight surgeon's analysis: "The pilot found himself pinned in the aircraft in such a way that it was impossible to free himself. However, he remained alert and in an excellent frame of mind for the 16 hours it required for the ground party to reach him. Had an aircraft survival kit been carried in the aircraft's cabin area, he would have had a much more comfortable wait. Survival for a longer period of time would have been much easier with a survival kit available.

"It rained during much of the night and he was able to collect significant amounts of drinking water. He had no containers in which to collect water and the cabin area remained rain proof.

". . . The effectiveness of the pencil flare gun in this particular case is remarkable. Being pinned face down with the aircraft in a 90° attitude and with the cabin covered with a fallen treetop, it would seem impossible that any effective signal could be given. The flare penetrated the jungle canopy which was 150 feet high and was easily seen by a search aircraft during daylight. In this particular case the exact position of the crashed aircraft was known and the rescue would have taken place in the absence of a signal. However, in this type of terrain, direct observation of the accident or an effective signal is absolutely necessary for rescue to take place in a reasonable period of time.

"Radios in the aircraft were not operating. A survival radio (URC-14) was carried in the aircraft, but it was stored in the tail cargo compartment and could not be used by the pilot as he was trapped in the cabin area.

"The pilot was not carrying a survival kit as required by AR 95-1 and local regulations."

THE CASE FOR *Checklists*

Accident Number One . . . $99,529.00

A U-6A landed to the northeast on a 4,000 foot paved road strip. Five passengers were offloaded and one stood fire guard while the pilot restarted his engine to take off.

Passenger: "The pilot started the engine and made his runup. He then started his takeoff roll to the southwest. . . .

"The aircraft continued up the roadway centerline to a point approximately half the runway length and the tail wheel and main gear cleared the roadway approximately one foot for some distance. I then saw the right wing drop almost to the ground and the aircraft rocked back on all three

" . . . in order to obtain a high airspeed in the shortest possible distance" was the pilot's reason for his takeoff roll with no flaps.

gear. At this time, a jeep, blocking the road, moved off and the aircraft continued on, veering slightly to the right and striking a 5 ton dump truck which had been stopped to await the takeoff . . ."

Witness: ". . . I saw the pilot in his plane and heard him exclaim, 'switch on!' He then started the engine, remained stationary briefly, then began moving away toward the end of the strip. At first I thought he was going to taxi down, turn around, and take off into the wind. Instead, he seemed to pick up speed. As I watched, the plane appeared to lift slightly from the road and then come down. Suddenly his right wing hit the 5 ton dump truck and folded up into the air. Part of the wing appeared to fly over the truck and land somewhere behind it. . . ."

DA Form 2397-3: ". . . The pilot did not lower flaps prior to beginning his takeoff roll, but put down takeoff flaps at about 50 knots. At this point, the aircraft broke ground, and a gust of wind caused the right wing to drop. While the pilot was correcting for the gust, the aircraft settled back to the roadway and the right wing struck a 5 ton dump truck which was stopped at the end of and to one side of the strip. The right wing was torn from the aircraft, a part remaining on the front of the truck, and the outboard section being torn off and thrown 150 feet farther down the road. The aircraft continued straight down the road for 276 feet, then veered right off the road, crossed a drainage ditch, went up a slight rise, and came to rest in low brush 505 feet from the point of impact with the truck."

Questioning by the investigation board brought out the pilot's reason for making his initial takeoff roll with no flaps. It was, in the pilot's words, "in order to obtain a high airspeed in the shortest possible distance." When questioned about the wind, he estimated it to be variable from the north to northeast at 5-7 knots. This questioning also brought out the fact that the pilot was unaware of his trim settings before beginning the takeoff roll.

Aircraft commander and pilot were convinced gear was down, but witnesses saw U-8 fly pattern and land with gear up

Checklists

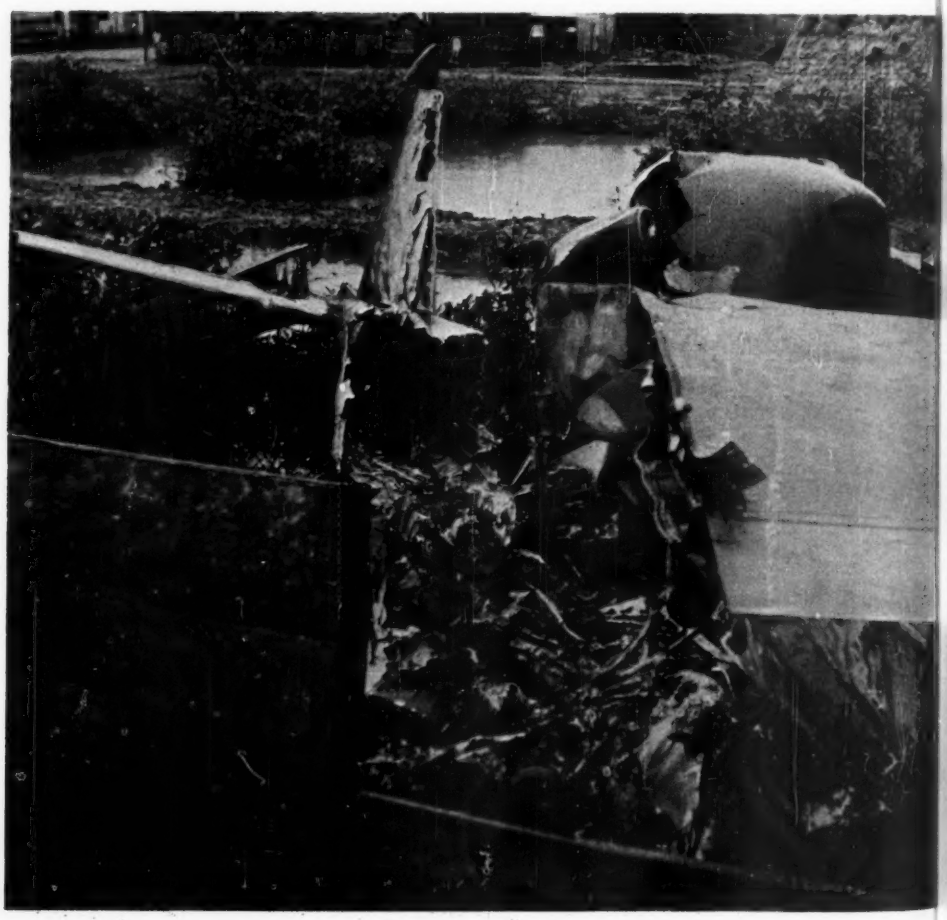
Accident Number Two . . .

Five Lives And $99,529.00

Accident report narrative: "The aircraft was in the process of taking off on runway 27 (1,750 feet long, 70 feet wide, composed of crushed rock) . . . . In addition to the pilot and crewchief, the airplane was carrying three passengers. . . .

"The aircraft began its takeoff roll at the extreme east end of runway 27. It was seen to run the entire length of the runway, through a barbed wire fence 50 yards beyond the west end of the runway, across a road, and down a canal branch running west to a main canal . . . . At the junction of the canals, the aircraft hit a steel barge, protruding approximately 5 feet above the water, at which point it caught fire and burned almost completely. There were no survivors."

". . . From talking to several personnel at the airfield, it was learned that the pilot originally planned to eat supper there, but several factors influenced him to change his mind. The weather



U-6A hit barge and burned during attempted takeoff with full nose-down trim. Flaps probably were not lowered by pilot who was hurriedly leaving airfield ahead of weather to avoid RON

was getting worse and he figured that in a short time it would be so bad that he would have to RON. Then he discovered there were no sleeping quarters available for himself and his passengers. He decided to pick up some sandwiches that they could eat en route. One of the witnesses said that the pilot was in quite a hurry to depart.

". . . The members of the board examined and took photographs of the wreckage. The flaps and flap hinges were examined in an effort to determine the position of the flaps at the time of impact. No indication could be found to warrant a conclusion as to the position of the flaps. A search for the flap indicator was made, but it could not be found and was presumed to have been destroyed by fire. The board noted that on impact the inertia of the wings had caused them to separate from the fuselage and displace so that the left wing came to rest to the right of the aircraft and the right wing to the left of the aircraft. From this, the board concluded that the trailing portions of the wings separated from the fuselage before the leading portions. This being the case, the flaps separated from the flap operating rods as the wings separated from the fuselage. Thus, the flaps were free to streamline as the wings continued through the air.

"Dents were found in the leading edges of the flaps opposite each flap hinge. If the flaps were at zero degrees during takeoff, these dents could have been caused during the initial impact by the flaps hitting the flap hinges. However, once the wings separated from the fuselage, the flaps were free to move to any position. As the wings landed on the steel barge, the impact may have been sufficient to cause the leading edges of the flaps to be dented by striking the flaps hinges. . . .

"The elevator was inspected and found to be relatively undamaged. The elevator trim tab was found to be in an almost full nose-low position. The board felt that this trim tab setting would not have changed during the crash and that almost full nose-down trim was used by the pilot. . . .

"Cause factors: The primary cause of the accident was pilot error in that the pilot failed to abort the takeoff, even though the aircraft was not taking off normally. The board believes that the pilot failed to use flaps during takeoff. This would indicate that a thorough pre-takeoff check was not made. The pilot was expediting his departure to avoid being weathered in, and this may have caused him to rush his pre-takeoff check and overlook the flaps. . . .

"Recommendations: The necessity for selecting and adhering to a point in which a takeoff is to be aborted should be emphasized to all pilots. Pre-takeoff and other checklists *must* be used. . . ."

Accident Number Three $16,094.00

U-8D aircraft commander (3,987 flying hours): ". . . We flew up the valley just below the broken cloud cover and followed a C-47 and a CV-2B into left hand traffic for runway 10. The pilot determined that he was overtaking the CV-2B and initiated a 360° turn before entering downwind. At this time, I mentioned that we were 2,000 feet above field elevation, so the pilot slowed the aircraft and asked me to lower the landing gear, which I did.

"When the gear indicated down and locked, I reported it to him and he continued to descend on downwind. The flaps were lowered fully on base. I noticed numerous helicopters operating from the field, most of which were departing at low level parallel to the runway and downwind, almost directly into landing traffic. I devoted nearly all of my attention to keeping track of those nearby helicopters during final approach. When the aircraft was flared for landing and the throttles closed, it settled onto the runway, the propellers striking the ground. No gear warning horn sounded. The mixtures were cut off by the pilot and the switches turned off. When the aircraft stopped, we immediately got out. When I returned to the aircraft a moment later, I noticed that the gear handle was still in the down position. . . ."

Question: "Were there any indications of other than normal gear operation prior to this landing?"

Answer: "None. We had made two landings prior to this one."

Pilot (2,155 flying hours): ". . . In order to expedite our descent for landing, I slowed the aircraft down and asked the A/C to drop the gear. I felt the gear go down in position and checked the three green lights which were on. I did not check the floor indicator. I then lowered the nose and further decreased power and started the downwind leg.

"I noticed that the aircraft was hard to slow down on downwind, but I attributed this to the strong wind that was blowing from the rear.

Downwind takeoff, started with no flaps and undetermined trim settings, came to grief when right wing was sheared on dump truck

Question: "Did you definitely feel the gear go down?"

Answer: "Yes and I visually checked the three indicator lights and they were green."

Question: "Did you at any time feel the gear come up?"

Answer: "No."

Question: "Was the operation of the gear, prior to this landing, normal?"

Answer: "Yes."

Question: "Did you notice any malfunction of any part at any time?"

Answer: "No."

Question: "Was the gear warning horn sounding?"

Answer: "No."

Question: "Did you know it was inoperative and written up as 'removed' on the –14?"

Answer: "No. I should have checked, but didn't. I only checked the –13."

Question: "Did you recheck the gear on final?"

Answer: "No."

Question: "What was the position of the gear handle after you were on the ground?"

Answer: "It was in the down position."

Witness: "I was standing on the parking ramp when I noticed a U-8D on downwind and watched it make its approach. As it turned base, I commented that the gear was not down and the airspeed looked high. When it turned final, I again noticed that the gear was not down. The aircraft continued its approach and landed gear up."

Accident report analysis: "Materiel failure was considered a possible cause factor in this accident. However, the investigation, maintenance checks, and witness statements indicate normal landing gear switch and landing gear system operation prior to the landing. Examination of the landing gear switch by maintenance following recovery revealed no apparent malfunction. Examination of the damage report indicated that damage to the landing gear system could only have been caused by activation of the gear immediately following touchdown or during the recovery operation. . . .

"It is the opinion of this board that the accident was the direct result of the failure of the pilot and aircraft commander to check the landing gear for proper indications prior to landing.

". . . Standardization and training should be considered contributing factors. While the statements of the crew agree that the landing gear had been lowered upon pattern entry, the statements of rated personnel on the ground observing the approach also agree that at no time in the landing pattern was the landing gear seen extended. Neither the pilot nor the aircraft commander was able to recall making a final gear check prior to ground contact."

From another Service:

CHECKLIST DISCIPLINE

There should be no need to dwell upon the purpose of a checklist; the requirements for its use; how many manhours, dollars, and time are involved in compiling, verifying, and publishing them; or how experience has shown that fewer accidents occur when checklists are followed. If you conscientiously follow the checklist each and every time it is required, you are undoubtedly a "pro" and need not absorb the following. If, however, you don't conscientiously follow checklists, get ready for some conscience wrestling. IRRESPONSIBILITY is a nasty word in military circles — agreed? Deliberately jeopardizing your career really doesn't make much sense. That is a pretty blunt way of putting it, but these are facts you must face if you deviate from required checklists.

Safety and supervisory personnel throughout the chain of command are quite concerned about failure to follow checklists. Many mishaps costing millions of dollars, loss of combat potential, and lives have occurred which would have been prevented had the correct checklist procedures been followed. The question often arises as to what can be done to insure checklist compliance. Applying proper action when failure to follow the checklist occurs would provide a major solution to the problem. Failure may result from a number of circumstances, of which the appropriate one may be difficult to determine. Some of these are distractions, preoccupation, or carelessness. The other category of circumstances may be best described as deliberate acts of negligence. They may be rather innocent acts, but the degree of negligence is normally immaterial. Training programs involving checklist use should stress the possible effects of preoccupation and distractions upon checklist compliance. Retraining and education may be adequate for preoccupation and distractions, but disciplinary action is usually called for whenever acts of negligence occur.

A professional unit is the desired safety goal. Discipline is a prime factor in attaining and maintaining a professional level in any field. If checklist discipline is lacking, then discipline is apparently lacking in other areas as well. How does your unit measure up?

BEFORE TAKEOFF (U-6A)

Mixture lever — FULL RICH.
Propeller lever — FULL INCREASE.
Wing flaps — TAKEOFF.
Trim wheels — CHECK.
Flight instruments — CHECK.
Engine instruments — CHECK.
Pitot heat switch — AS REQUIRED.
Shoulder harness inertia reel lock levers — UNLOCKED.
Carburetor hot air lever — COLD.
Doors — CLOSED AND SECURE.
Passengers — ALERTED FOR TAKEOFF.
Flight controls — CHECK.
Water rudders — RETRACT (IF APPLICABLE).
Takeoff and landing data card — REVIEW.
ANTICOLLISION light switch — ON.

TRAFFIC PATTERN CHECKLIST (U-8D)

Landing gear handle — DOWN.
Airspeed — 120 TO 125 KNOTS IAS.
Trim tab wheels — AS REQUIRED.
Landing gear position indicators — CHECK LANDING GEAR DOWN AND LOCKED.
Wing flap switch — DOWN; 20 DEGREES, THEN OFF.
Airspeed — 105 TO 110 KNOTS IAS UNTIL TURN ONTO FINAL APPROACH.
Wing flap switch — DOWN.
Propeller levers — FULL LOW PITCH (HIGH RPM).
Airspeed — APPROXIMATELY 90 TO 95 KNOTS IAS ON FINAL APPROACH.

PROUD PAWNEE PACING PACK

Small in size but big in performance, the Army's OH-6A has claimed 23 world records including two marks held by the French and one mark held by the Russians. In four cases the OH-6A more than doubled existing records.

The challenged French records are a distance mark of 778.31 miles and a speed mark of 64.506 mph—both in the light-helicopter class. The OH-6A upset the distance mark by flying 1,739.836 miles and the speed record by hitting 153 mph.

A Russian held speed record of 105.91 mph was eclipsed by the OH-6A when it averaged 155 mph in the 500 kilometer speed event in the light helicopter class.

The flights were conducted during March and April of this year and were observed by officials of the National Aeronautic Association which is the official U. S. representative of the Federation Aeronautique Internationale (FAI) of Paris, France. The latter is the official certifying body for all world aircraft records and is now reviewing the Army's claim to the 23 new records.

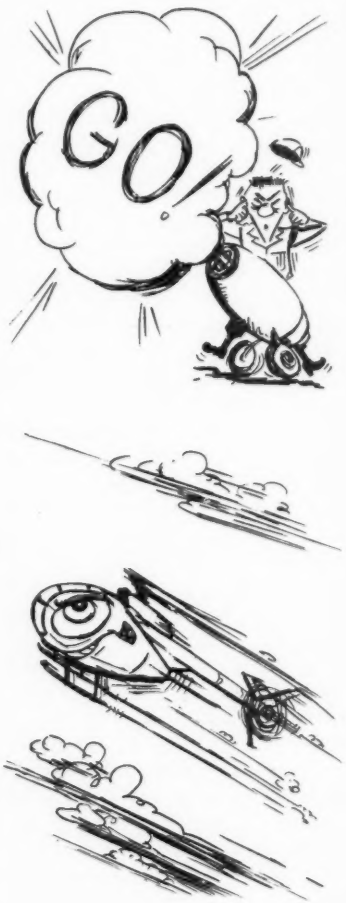
The record setting flights were made by five Army and three civilian pilots at Edwards AFB, Calif., and the Hughes plant at Culver City, Calif.

If certified, the claimed records would give the Army 44 of the 45 U. S. held marks. Russia would then hold 13, France 6 and Czechoslovakia 1 (see DIGEST, July 1965 for previous records).

23 WORLD HELICOPTER FLIGHT RECORDS CLAIMED BY THE US ARMY FOR ITS OH-6A

EVENT-DATE	PILOT	RECORD
CLASS E-1 (open class, any weight)		
*Distance (straight line) 4/7/66	R. Ferry	2,193 mi; Culver City, Calif.—Daytona Beach, Fla.
*Distance (closed circuit) 3/26/66	J. Schweibold	1,739.836 mi
Altitude (horizontal flt) 3/27/66	J. Zimmerman	26,448 ft
*Speed (2,000 km, closed circuit) 3/20/66	CWO R. Szczepanski	141.523 mph
CLASS E-1.b (1,102-2,204 lbs)		
Distance (closed circuit) 3/21/66	J. Zimmerman	1,056.329 mi
Altitude (horizontal flt) 3/27/66	J. Zimmerman	26, 448 ft
Speed (3 km course) 3/24/66	LTC R. Heard	171.11 mph
Speed (15/25 km course) 3/24/66	LTC R. Heard	171.85 mph
Speed (100 km, closed circuit) 3/13/66	MAJ A. Darling	161 mph
Speed (500 km, closed circuit) 3/13/66	MAJ A. Darling	158 mph
Speed (1,000 km, closed circuit) 3/13/66	MAJ A. Darling	155 mph
Time to climb to 3,000 meters 3/27/66	J. Zimmerman	4 min, 1.5 sec
Time to climb to 6,000 meters 3/27/66	J. Zimmerman	7 min, 12 sec
CLASS E-1.c (2,204-3,858 lbs)		
Speed (3 km course) 3/23/66	COL J. Gude	172.41 mph
Altitude (horizontal flt) 3/27/66	J. Zimmerman	18,055 ft
Speed (15/25 km course) 3/23/66	COL J. Gude	169.132 mph
Speed (100 km closed circuit) 3/12/66	COL D. Kyle	156 mph
Speed (500 km, closed circuit) 3/12/66	COL D. Kyle	155 mph
Speed (1,000 km, closed circuit) 3/12/66	COL D. Kyle	153 mph

*Record also claimed for E-1.c class



How lonely a sight—this Huey and its crew on a Christmas night. But in a sense many others are present—those who flew Army aircraft on Christmas nights in the early 1940s over the enchanting but treacherous desert of North Africa; or through the biting cold on the white European countryside; or in the eerie strangeness of a sweltering Pacific jungle.

Then a decade later Christmas nights were accented by the majestic but menacing Korean mountains. Still another decade later others are experiencing Christmas nights over the merciless rice paddies and mountains of another Asian country, the Republic of Vietnam. These join the invisible throng of all who have experienced similar Christmas nights. They are bound together by a common faith in their mission, their country, and the Spirit of Christmas.

AVIATION DIGEST
AVIATION DIGEST
AVIATION DIGEST
AVIATION DIGEST
AVIATION DIGEST
AVIATION DIGEST